

DATA BRIEF

Minnesota Trends in Obesity and Tobacco and Associated Health Care Spending, 1999-2017

Overview

- Obesity and tobacco use are two of the top preventable causes of death and disease¹ and are responsible for billions in excess medical expenses in Minnesota each year.
- Minnesota state agencies and state and local organizations have invested substantial resources in the development of upstream initiatives to prevent obesity and tobacco and reduce associated health care costs.
- **This data brief explores Minnesota's progress in addressing obesity and smoking rates since 2011 and estimates health care spending averted because of this progress.**
- This brief also highlights coordinated obesity and tobacco prevention efforts in Minnesota, including the Statewide Health Improvement Partnership (SHIP), which works in partnership with other state and local initiatives to reduce obesity and smoking, two major risk factors contributing to costly chronic conditions.

Health Care Costs of Obesity and Smoking in Minnesota Are Substantial

Obesity

The health care costs of obesity and tobacco use are substantial. Obesity in Minnesota was responsible for an estimated \$3.2 billion in excess medical costs in 2017 dollars² (see Methods section). Approximately 35% of these costs are financed by Medicare and Medicaid.

Smoking

Smoking in Minnesota was responsible for an estimated \$3.34 billion^a in excess medical spending in 2017 dollars³ (see Methods section). Over a third (36%) of these costs are due to hospital care, 15% are from nursing home expenses, 13% for ambulatory care, 8% on prescription drugs, and 29% for other services.

Rates of Change in Obesity and Smoking Show Signs of Improvement

The increase in the obesity rate^b for Minnesota adults has slowed substantially since 2011. From 1999 to 2009, the obesity rate increased nearly 1 percentage point each year for ten years, from 15.5 percent in 1999 to 25.4 percent in 2009. If the obesity trend from 1999-2009 had continued, there would be an estimated 135,068 more obese Minnesotans—11.4% more than there actually were in 2017 (estimate of obese Minnesotans in 2017: 1,183,931).⁴ Instead, the rate of change in obesity was cut in half, from +.99 percentage points per year between 1999-2009 to +.45 percentage points per year between 2011-2017.

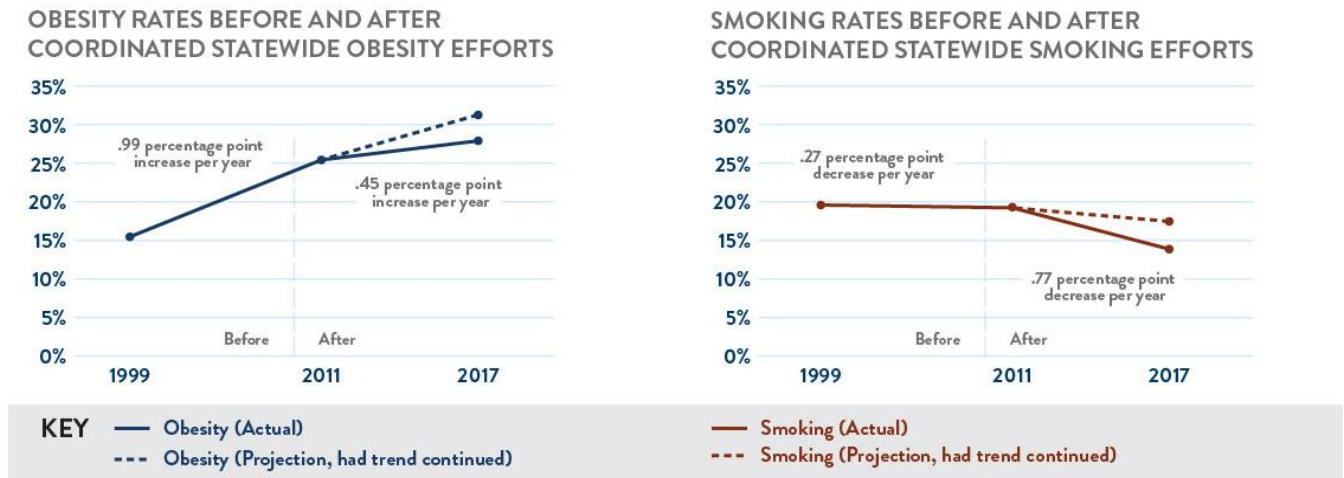
The cigarette smoking rate for Minnesota adults continues to fall; the rate of decrease has accelerated since 2011. Between 1999 to 2009, the smoking rate decreased .27 percentage points each year, from 19.5 percent in 1999 to 16.8 percent in 2009. If the smoking trend from 1999-2009 had continued, there would be an estimated 124,229 more smokers in Minnesota—20.6% more than there actually were in 2017 (estimate of smokers in Minnesota in 2017: 604,472).⁴ Instead, the rate of decrease in smoking tripled, from -.27 percentage points per year between 1999-2009 to -.77 percentage points per year between 2011-2017.

^a This estimate includes costs of current *and* former smokers. Subsequent analyses focus on costs attributable only to current smokers. See Methods section for additional information.

^b This data brief uses the terms “obesity rate” and “smoking rate” to indicate the percentage of the population that is obese or that smokes cigarettes at a point in time (i.e., prevalence). The “rate of change” refers to the slope of the line between two points in time (i.e., how fast the prevalence is changing).

MINNESOTA TRENDS IN OBESITY AND TOBACCO AND ASSOCIATED HEALTH CARE SPENDING, 1999-2017

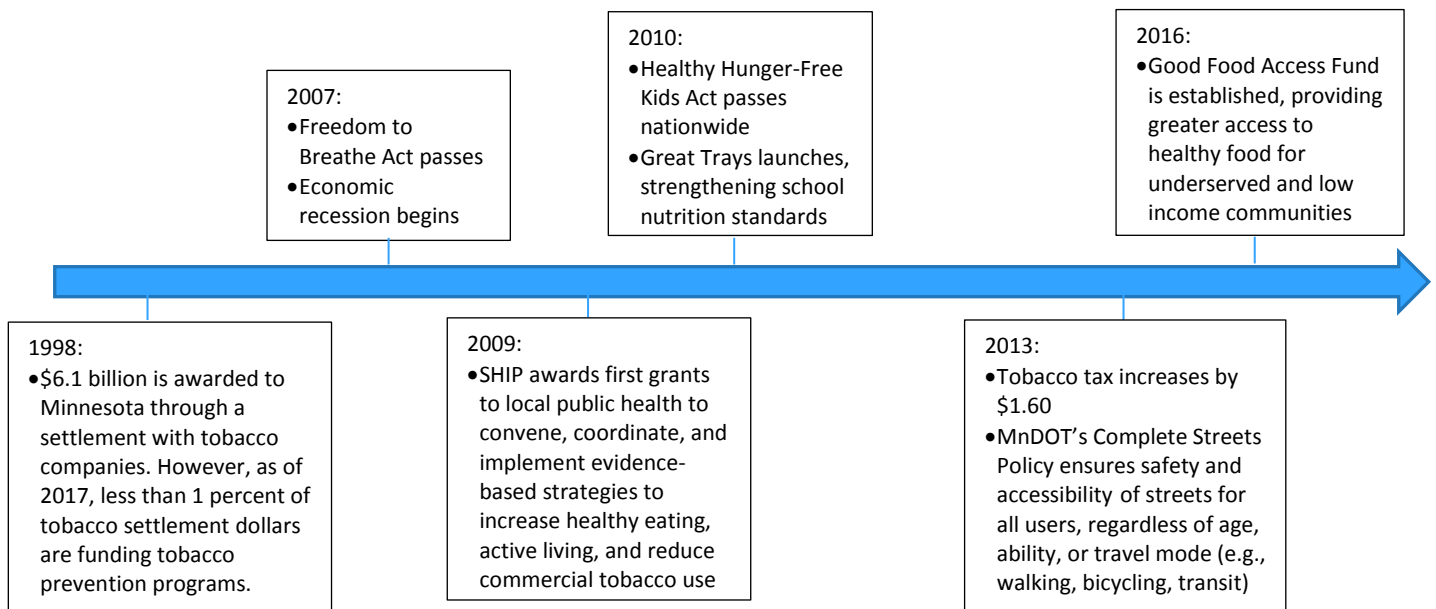
The following illustration shows the rate of change in obesity and smoking from 1999-2009 and projected rates through 2017 had the 1999-2009 trend continued.



These illustrations are based on data from the Behavioral Risk Factor Surveillance System, 1999-2017.

**NOTE: BRFSS methodology changed to include cell phones in addition to landlines in 2011. See Technical Notes below for more information.

The following illustration identifies key events contributing to obesity and smoking rates in Minnesota.



Health Care Spending Averted since 2011

As the number of people who smoke or are obese changes, so do the health care costs associated with treating these individuals. Using research from the health economics literature

MINNESOTA TRENDS IN OBESITY AND TOBACCO AND ASSOCIATED HEALTH CARE SPENDING, 1999-2017

and a study by Blue Cross and Blue Shield of Minnesota,^{3,4} we estimated the health care dollars that would have been spent had trajectories in obesity and smoking from 1999-2009 continued. The data and methods presented here represent one of many ways to estimate health care costs averted. The studies used to generate estimates of per person obesity and smoking costs were selected based on scientific merit, pertinence to the research questions, and inclusion of Minnesota-specific estimates.

Obesity

Since 2011, an estimated \$365.8 million in health care spending was averted (\$2,708 in excess annual medical expenditures per obese person) due to a slower increase in the obesity rate from 2011-2017 compared to 1999-2009.

Smoking

Since 2011, an estimated \$252.4 million in health care spending was averted (\$2,032 in excess annual medical expenditures per current smoker) due to a faster decrease in the smoking rate from 2011-2017 compared to 1999-2009.

Obesity + Smoking Health Care Spending Averted

These changes in obesity and smoking trends in Minnesota suggest that well over half a billion dollars—\$618.2 million—in health care spending was averted since 2011.

Statewide Obesity and Smoking Efforts

Obesity and tobacco use are two of the top preventable causes of death and disease¹ and are responsible for billions of dollars in excess medical expenses in Minnesota each year. Poor diet, lack of physical activity, and commercial tobacco use contribute to chronic disease burden. Increasing or improving environmental factors that contribute to health-promoting behaviors both improves quality of life and reduces financial burdens associated with chronic disease.

The obesity rate in Minnesota increased dramatically from 1999 to 2009. In this same period, progress made in reducing the smoking rate slowed. In response to these trends, state agencies, partner organizations, local public health agencies, and communities launched a coordinated, statewide efforts to combat obesity and smoking in Minnesota. While changes in macro-level factors (e.g., demographics, economics, and national public awareness of the harms of obesity and tobacco) influence obesity and smoking, recent changes in Minnesota's obesity and smoking rates suggest that coordinated statewide policy and systems change efforts to create environments that facilitate healthy behaviors have also made a difference. In the past 12 years, Minnesota has adopted tobacco tax increases, passed a clean indoor air law, strengthened school nutrition standards and physical activity guidelines, and funded local public health agencies and non-profits to address obesity and tobacco at the state and local level. In fact, the increase in the national obesity rate from 2011-2017 also slowed down, but not as much as Minnesota's obesity rate. This suggests that Minnesota's progress outpaced the

rest of the nation. The same is true for the national smoking rate compared to Minnesota's smoking rate.

SHIP's Contribution

In order to reduce the cost of health care spending related to chronic conditions, the Minnesota state legislature passed groundbreaking legislation to fund SHIP in 2008. Since passage, the Minnesota Department of Health has provided \$132 million in funding, capacity building, training, and technical assistance to local public health and tribal health departments through SHIP. SHIP communities identify healthy eating, active living, and commercial tobacco control strategies that reflect community priorities and leverage other resources and funding from multi-sector partners (e.g., the Minnesota Departments of Transportation, Education, and Agriculture; Blue Cross and Blue Shield Center for Prevention; ClearWay MinnesotaSM; state and national foundations). Due to the complexity of policy, systems, and environmental change efforts, consistent, coordinated, and sustained effort is essential to successful community health outcomes. SHIP, which is active in all counties and ten tribal nations across the state, facilitates partners at the state and local level to multiply resources and champion broad-based community action.

Conclusions: Minnesota is Making Progress on Obesity and Smoking

- Since 2011, the increase in obesity has slowed and the decrease in smoking has accelerated with the expansion of coordinated statewide action to address these risk factors.
- During this time period, Minnesota state agencies, local public health agencies, and other state and local partners have implemented major initiatives to combat obesity and smoking.
- Changes in trajectories of obesity and smoking rates are associated with changes in health care spending.
- An estimated \$618.2 million—over half a billion dollars—in health care spending was averted because of changes in obesity and smoking rates since 2011.
- Many factors have contributed to obesity and smoking trends in Minnesota. While it is difficult to quantify the effect of any one individual factor, Minnesota's progress on obesity and tobacco has outpaced that of the nation, suggesting that the combined contribution of SHIP and coordinated obesity and tobacco prevention efforts is substantial.
- The landscape of population health changes continuously with new threats emerging such as e-cigarettes on youth smoking rates and other social determinants that influence risk factors in individuals and communities. Continued investment in prevention strategies plays a critical role, now and into the future, as we work to improve the health of all Minnesotans.

MINNESOTA TRENDS IN OBESITY AND TOBACCO
AND ASSOCIATED HEALTH CARE SPENDING, 1999-2017

Technical Notes

Definitions

- *Obesity* is an abnormal or excessive fat accumulation that may impair health.⁵ Although there are a number of ways to measure fat accumulation, the most common population-level measure is a calculation based on weight and height called Body Mass Index (BMI).⁵ Using this system a person with a BMI of 30 kg/m² or greater is defined as obese.⁶
- *Smoking status* is used to categorize individuals based on their current smoking behavior. The Centers for Disease Control and Prevention recommends using a two-item indicator to assess smoking status that captures whether individuals have smoked at least 100 cigarettes in their lifetime and whether they currently smoke every day, some days, or not at all. Those who have smoked 100 cigarettes and currently smoke every day or some days are categorized as current smokers and appear in the numerator of the smoking rate calculation (i.e., current smokers / [current smokers + current non-smokers]).

Methods

- The 1999-2009 and 2011-2017 time periods were chosen because they represent ten years before and 6 years after (based on available data) the beginning of coordinated statewide action on obesity and tobacco. Data from 2010 was not included in this analysis because it came after the start of coordinated statewide action to address obesity and tobacco and before BRFSS changed methods to include cell phones. Because 2010 and all subsequent years used different data collection methods, we chose not to include 2010 in the “post-coordinated statewide action” time period.
- Estimates of projected obesity and smoking rates had the 1999-2009 rate of change continued were calculated by taking the difference between the 1999 and 2009 obesity rate and dividing by 10 (i.e., the number of years of change between 1999 and 2009). For example, 25.4 [2009 obesity rate] – 15.5 [1999 obesity rate] = 9.9 / 10 years = +.99 percentage point increase per year from 1999-2009; 25.7 [2011 obesity rate] + (.99 [percentage point increase per year]*6 years) = 31.6.
- The per person cost estimate for obesity was obtained by first multiplying the population of Minnesota adults by the obesity rate for 2017 (4,168,770 * 28.4% = 1,183,931). Next, Minnesota’s annual cost of obesity estimate from Trogdon et al. (2012)² was adjusted for inflation using data from the U.S. Bureau of Economic Analysis⁷ (Table 2.5.4: Price indexes for personal consumption expenditures by function—37. Health: 2009 index value=93.67, 2017 index value=107.22, or a 2009-to-2017 multiplier of 107.22/93.67 = 1.145; \$2,800,000,000 * 1.145 = \$3,206,000,000). The annual cost of obesity in Minnesota was then divided by the number of obese Minnesotans to estimate per person cost of obesity (\$3,206,000,000 / 1,183,931 = \$2,708).
- The per person cost estimate for smoking was obtained by first multiplying the population of Minnesota adults by the smoking rate for 2017 (4,168,770 * 14.5% = 604,472)^{4,8} to obtain the number of current smokers in Minnesota. Next, we estimated the proportion of annual cost of smoking that is attributable to “current smokers” (as opposed to distant and recent former smokers). Xu et al. (2015)⁹ suggests that 36.8% of health care costs from

MINNESOTA TRENDS IN OBESITY AND TOBACCO
AND ASSOCIATED HEALTH CARE SPENDING, 1999-2017

smoking are attributable to current smokers. We took the annual cost of smoking in Minnesota from the Blue Cross and Blue Shield Cost of Smoking report³ (2017) and multiplied it by the proportion of costs attributable to current smokers (\$3,194,000,000 * 36.8% = \$1,175,392,000) and adjusted it for inflation using data from the U.S. Bureau of Economic Analysis⁷ (Table 2.5.4: Price indexes for personal consumption expenditures by function—37. Health: 2014 index value=102.64, 2017 index value=107.22, or a 2014-to-2017 multiplier of 107.22/102.64 = 1.045; \$1,175,392,000 * 1.045 = \$1,228,284,640). We then took the annual cost of smoking that is attributable to current smokers and divided that figure by the estimated number of current smokers in Minnesota (\$1,228,284,640 / 604,472 = \$2,032) to obtain the per person cost of smoking. This method assumes that the accelerated decrease in the smoking rate was due entirely to prevention of smoking initiation and therefore did not affect the number and cost of former smokers. This assumption makes the smoking cost analysis comparable to the obesity cost analysis.

- Some calculated figures may not be replicable due to rounding.
- National rates of obesity and smoking from 1999-2017 are shown below.

		1999	2009	1999-2009 change per year	2011	2017	2011-2017 change per year
National	Obesity	19.8%	27.2%	+ .74	27.7%	31.6%	+ .65
	Smoking	22.7%	17.9%	- .48	21.2%	17.1%	- .68
Minnesota	Obesity	15.5%	25.4%	+ .99	25.7%	28.4%	+ .45
	Smoking	19.5%	16.8%	- .27	19.1%	14.5%	- .77

Source: BRFSS, 1999-2017.

NOTE: BRFSS methodology changed in 2011 so comparisons should not be made between rates from individual years before and after 2011.

Limitations

- BRFSS methodology changed in 2011 (cell phones were added; before that, only landlines were called) so comparing individual years of data before and after that year is not recommended. The obesity rate did not change substantially from 2010 to 2011, but the smoking rate increased considerably from 2010 to 2011, due in large part to the change in BRFSS methodology (data not shown). Comparisons made in this brief focus on *changes over time* before and after the methodology change (e.g., the *rate of decline* in smoking between 2011 and 2017 is greater than the *rate of decline* in smoking between 1999 and 2009). This brief does not include direct comparisons between single years from before and after the methodological change.

MINNESOTA TRENDS IN OBESITY AND TOBACCO
AND ASSOCIATED HEALTH CARE SPENDING, 1999-2017

- Ten years of data from before coordinated statewide action on obesity and commercial tobacco were compared with only 6 years of data after the change in BRFSS methodology. Diseases stemming from smoking and obesity take years to develop. The long-term effects of Minnesota's coordinated efforts to reduce smoking and obesity remain to be seen. We will continue to monitor these trends and update analyses as additional years of data become available.
- The comparison of rates of obesity and smoking from 1999-2009 and 2011-2017 does not account for changes in demographics, economics, and other conditions independent of public health efforts that may affect obesity and smoking. Therefore, the total cost averted cannot be solely credited to public health efforts.
- The data and methods presented here represent one of many ways to estimate health care costs averted. The studies used to generate estimates of per person obesity and smoking costs were selected based on scientific merit, pertinence to the research question, and inclusion of Minnesota-specific estimates. Different studies or methodological approaches may be more suitable for future investigations into health care costs averted.

Learn more at health.mn.gov/ship.

References

- ¹ Danaei, G., Ding, E. L., Mozaffarian, D., Taylor, B., Rehm, J., Murray, C. J., & Ezzati, M. (2009). The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Medicine*, 6(4), e1000058.
- ² Trogon, J. G., Finkelstein, E. A., Feagan, C. W., & Cohen, J. W. (2012). State-and payer-specific estimates of annual medical expenditures attributable to obesity. *Obesity*, 20(1), 214-220.
- ³ Blue Cross and Blue Shield of Minnesota (2017). Health Care Costs and Smoking in Minnesota.
- ⁴ Centers for Disease Control and Prevention (1999-2017). Behavioral Risk Factor Surveillance System.
- ⁵ World Health Organization, Obesity and overweight. Fact sheet No. 311. Geneva: WHO, 2013. 2013.
- ⁶ Snijder, M. et al. (2006). What aspects of body fat are particularly hazardous and how do we measure them? *International Journal of Epidemiology*, 35(1): p. 83-92.
- ⁷ U.S. Bureau of Economic Analysis. (2018). National income and product accounts. Accessed on January 7, 2019 from <https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey>.
- ⁸ American Community Survey, 2012-2016 5-year average. Accessed November 15, 2018 from <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>.
- ⁹ Xu, X., Bishop, E. E., Kennedy, S. M., Simpson, S. A., & Pechacek, T. F. (2015). Annual healthcare spending attributable to cigarette smoking: an update. *American Journal of Preventive Medicine*, 48(3), 326-333.

Minnesota Department of Health
Office of Statewide Health Improvement Initiatives
85 East 7th Place, Suite 220
PO Box 64882 St. Paul, MN 55164
651-201-5443
www.health.state.mn.us

March 21, 2019

To obtain this information in a different format, call: 651-201-5443. Printed on recycled paper.