THE ECONOMIC COST OF SMOKING IN MINNESOTA

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OUTLINE

- What we want to find out
- Why we want to know
- What we learned
- What methods we used
- What limitations we encountered
- Where we go from here

WHAT WE WANT TO FIND OUT

- What are the health and economic impacts of cigarette smoking in Minnesota?

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WHY WE WANT TO KNOW

- Despite progress in reducing smoking prevalence, smoking remains the leading cause of preventable death in the U.S.
  - Nationally, smoking accounted for $192 billion in medical costs and $163 billion in lost productivity due to 480,000 smoking-attributable premature deaths in 2014[1,2]

[1]Chapter 12: Smoking-attributable morbidity, mortality, and economic costs. In *The health consequences of smoking—50 years of progress: A report of the Surgeon General* (2014).
[2]Xu X, Bishop EE, Kennedy SM, Simpson SA, Pechacek TF (2014). Annual healthcare spending attributable to cigarette smoking: An update. *Am J Prevent Med* 48(3), 326–33.

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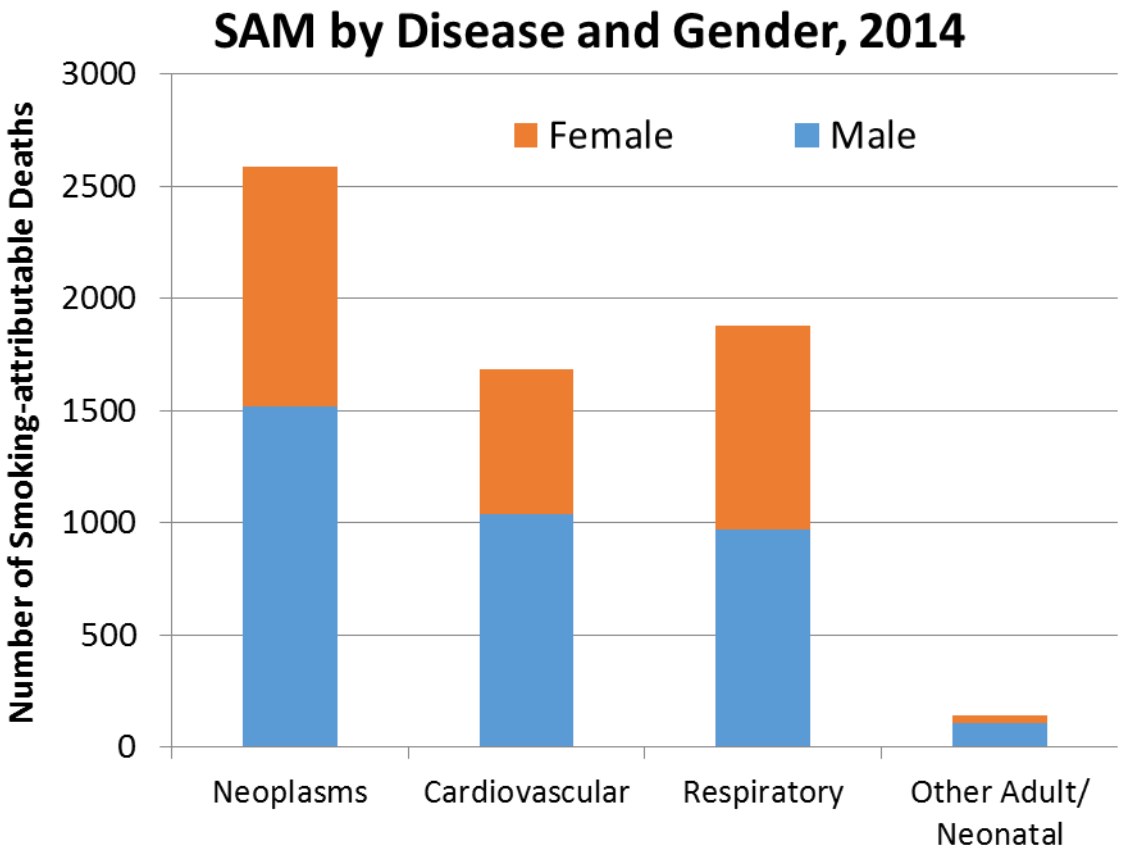
WHAT WE LEARNED

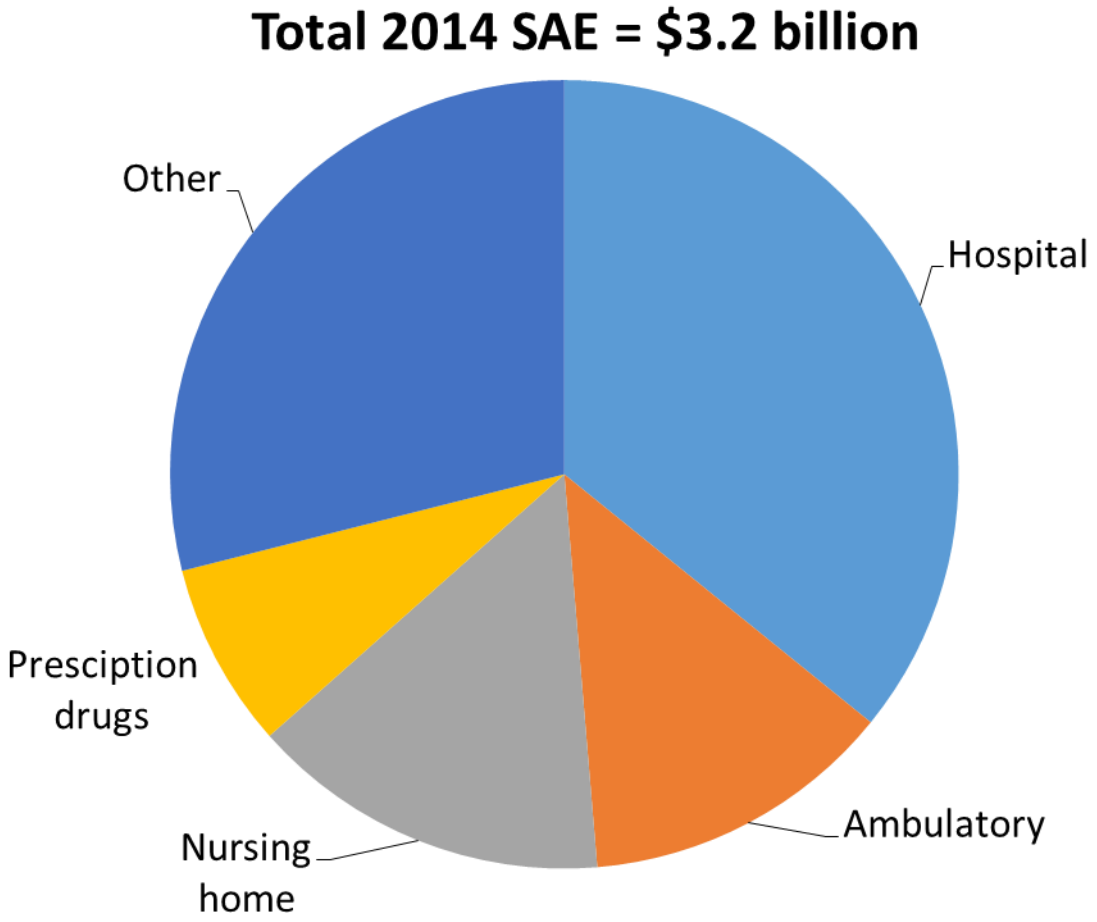
- In Minnesota, there are an estimated **6,312** smoking-attributable deaths each year, resulting in more than 83,000 years of potential life lost, which translate into a cost of over $4.3 billion in the value of lost future productivity
- The economic cost of smoking: **$3.2 billion** annually in smoking-attributable expenditures (SAE) on medical care services, or about $593 per capita

WHAT WE LEARNED: SMOKING-ATTRIBUTABLE DEATHS



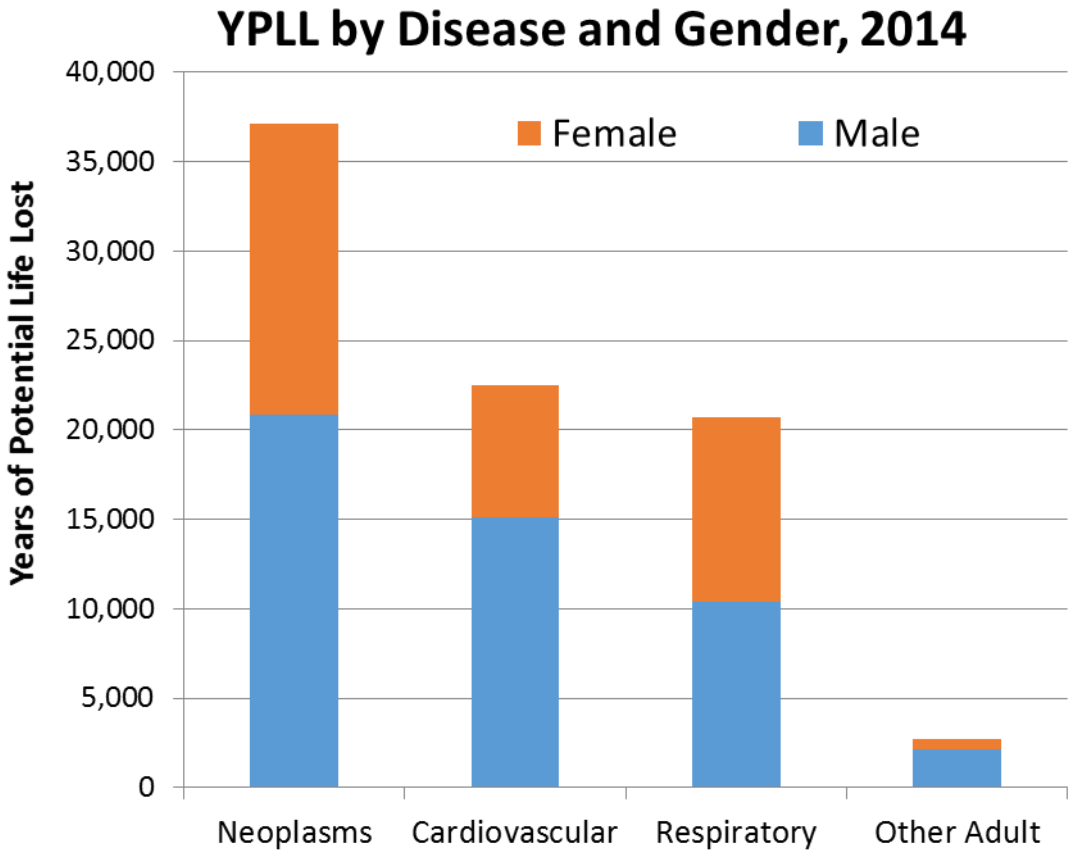
- Total 6,312 smoking-attributable deaths in Minnesota in 2014, including 3,637 deaths among males (58% of total 2014 SAM).
- Estimated 2,584 deaths from neoplasms (41% of total), 1,881 deaths from respiratory diseases (30% of total), and 1,703 deaths related to cardiovascular diseases (27% of total SAM).

WHAT WE LEARNED: SMOKING-ATTRIBUTABLE EXPENDITURES



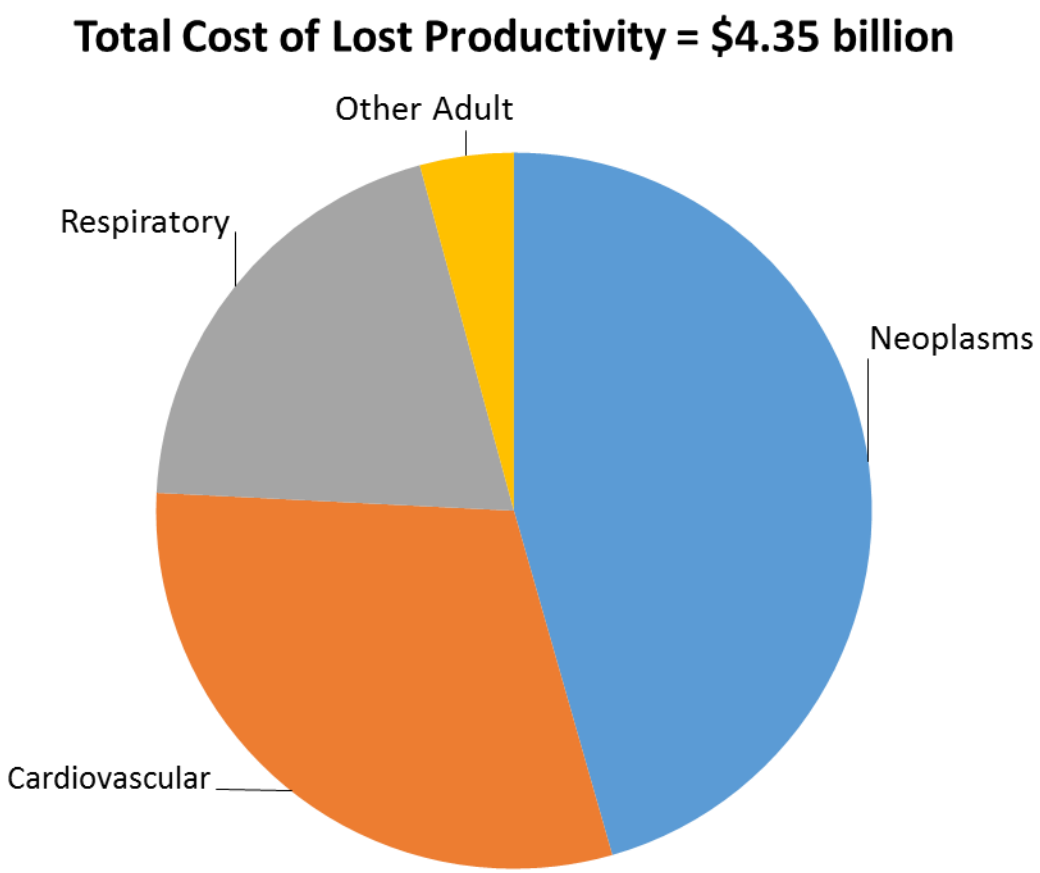
- Estimated smoking-attributable expenditures:
  - Largest contributions to SAE for hospital expenditures ($1.1 billion)
  - Second largest contribution to SAE ($924 million) was for other services, which includes home health services and hospice care

WHAT WE LEARNED: ESTIMATED YEARS OF POTENTIAL LIFE LOST



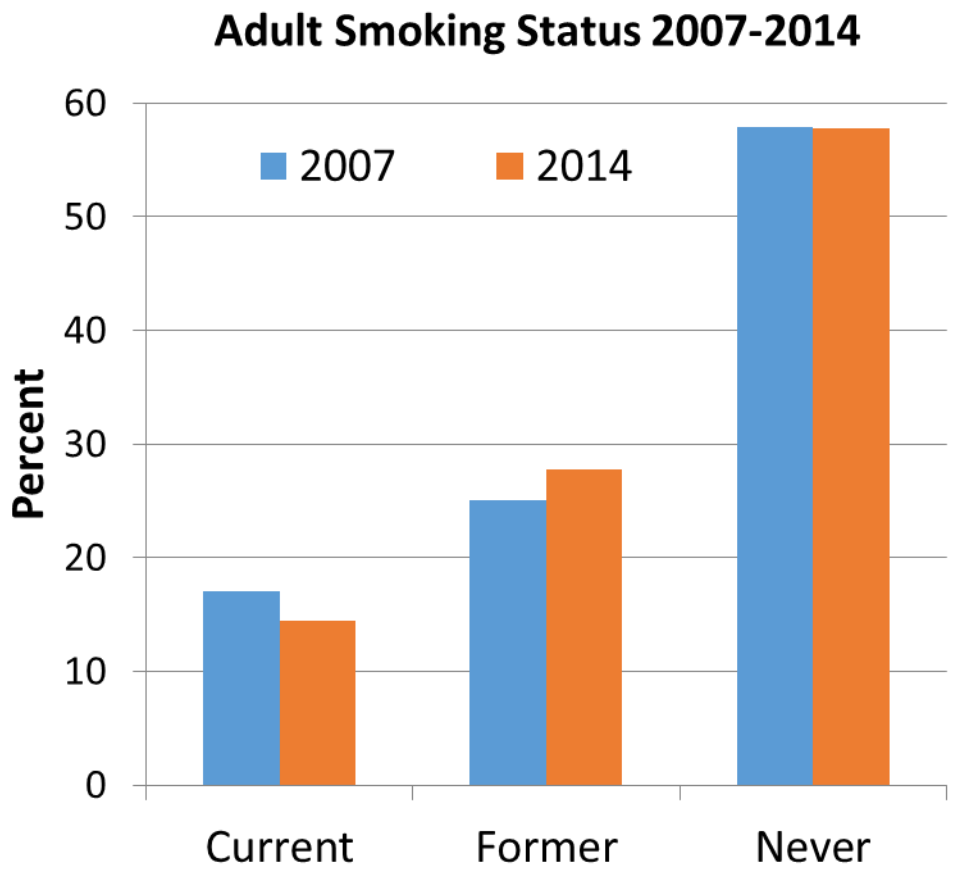
- Estimated years of potential life lost: 83,103
  - 37,151 years of potential life lost from neoplasms (45% of total), 22,484 for cardiovascular disease (27% of total), and 20,725 from respiratory disease (25% of total)
  - Among women, years of potential life lost for cardiovascular disease was greatest for those 75+
  - For males, years of potential life lost for cardiovascular disease was greatest for those 45-64

WHAT WE LEARNED: ESTIMATED COST OF LOST PRODUCTIVITY



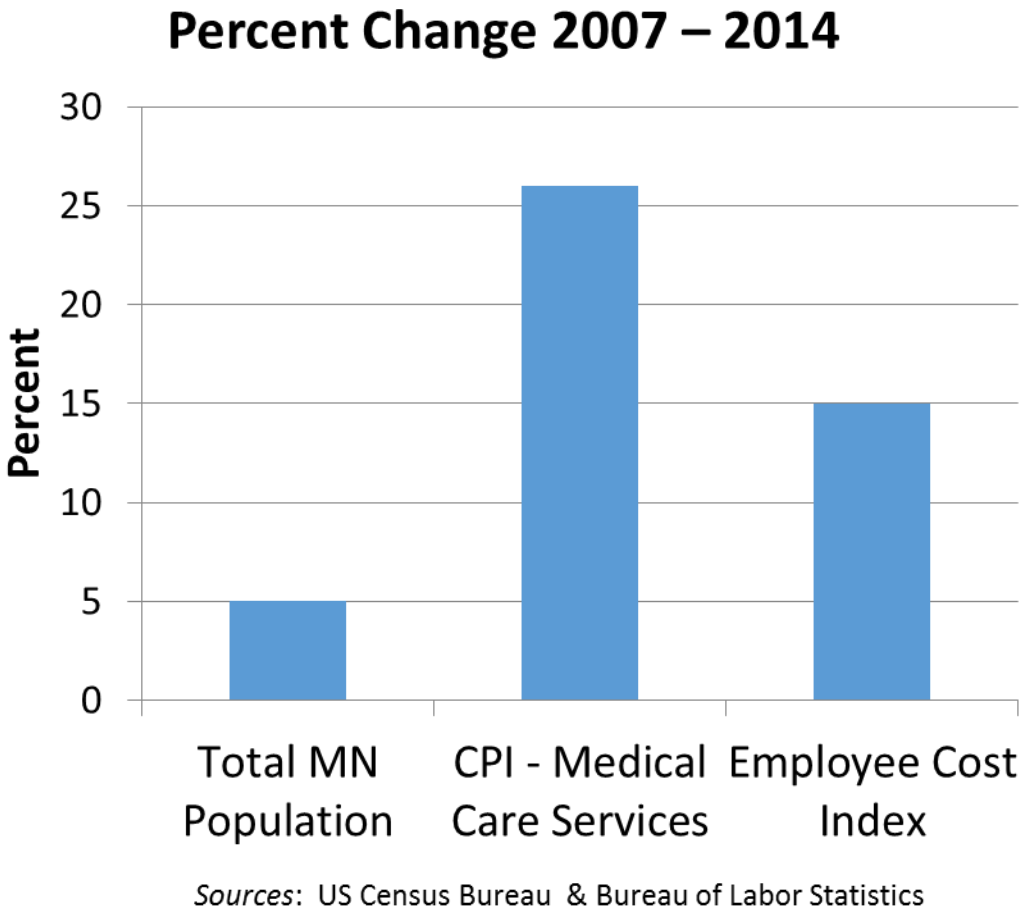
- Consistent with years of potential lives lost results, neoplasms accounted for $1.98 billion in lost productivity, cardiovascular diseases accounted for $1.32 billion in lost productivity, and respiratory diseases accounted for $869 million
- Lost productivity cost for males ($3.1 billion) greatly exceeded costs for females ($1.3 billion), in part due to higher estimated life-time earnings for males
  - Using estimates of male PVFE for females would increase estimated productivity costs

WHAT WE LEARNED: CHANGES IN MINNESOTA FROM 2007 TO 2014



- Overall, prevalence of current smokers decreased by 2.6 percentage points while former smokers increased by 2.7 percentage points, with negligible change for never smokers
- Across age groups, largest decrease in current smoking was for young adults 18-24 (6.2 percentage points)
- By gender, female current smoking decreased by 3.1 percentage points, whereas male current smoking decreased by 2.1 percentage points

WHAT WE LEARNED: CHANGES IN MINNESOTA FROM 2007 TO 2014 (CONT.)



- Minnesota population increased by 5%; modest changes in age-gender distribution
- Medical care service prices increased 26% (affects medical care expenditure)
- Employee costs increased 15% (affects lost productivity costs)
- Other changes
  - Updated disease-specific mortality data
  - Updated SAMMEC estimates of smoking-attributable health and cost impact

WHAT WE LEARNED: OTHER CHANGES

- SAMMEC methodology used in this report was substantially revised since 2007
  - More diseases and causes of death are attributable to smoking
  - Often higher risks of mortality with previously identified smoking-related diseases and causes of death

- Smoking cost estimates for different periods of time using different smoking attribution assumptions are not directly comparable

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WHAT METHODS WE USED

- Used methodologies recommended by the Centers for Disease Control and Prevention (CDC) in their Smoking-Attributable Mortality, Morbidity and Economic Costs (SAMMEC) model
- Smoking-attributable mortality (SAM) based on smoking-attributable fraction (SAF) of total mortality for specific conditions by age/gender:

$$SAF = \frac{(p_{never} + p_{former}RR_{former} + p_{current}RR_{current}) - 1}{(p_{never} + p_{former}RR_{former} + p_{current}RR_{current})}$$

- SAM used to estimate years of potential life lost (YPLL), based on estimates of life expectancy by age and gender
- Cost of lost productivity estimated as present value of future earnings (PVFE) over YPLL
- Smoking-attributable expenditures (SAE) on medical care based on estimated smoking-attributable expenditure fractions by expenditure category

WHAT METHODS WE USED (CONT.)

- Data
  - Medical Expenditure Panel Survey (MEPS)
  - National Health Insurance Survey (NHIS)
- Econometric predictive modeling of expenditure by category
  - Data includes all diseases
  - Model estimates impact of smoking status, adjusted for other individual characteristics
- Chapter 12, *The Health consequences of smoking – 50 years of progress: A report of the Surgeon General* (2014) uses estimates based on 2004 data
- More recent 2009 fractions reported by Max et al. (*Nicotine Tob Res* 2016)

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WHAT LIMITATIONS WE ENCOUNTERED

- Attribution to smoking
  - Health effects of smoking accumulate over a lifetime of smoking behavior. Comprehensive data on smoking history of adults who die from smoking-related diseases is not available
  - SAM estimates are based on mortality relative risk estimates using contemporaneous data on current smoking status for age and gender cohorts **and** mortality data by age and gender cohorts for specific disease conditions
  - Given the downward trend in smoking prevalence over past decades, relative risk estimates based on current patterns of smoking will reflect the health impact of higher rates of smoking in the past

WHAT LIMITATIONS WE ENCOUNTERED (CONT.)

- Report focused on cigarette smoking only; did not address the health or economic impact of other forms of tobacco use, such as cigars, pipes, smokeless tobacco, or the growing use of electronic cigarettes
- Several potentially substantial sources of smoking-attributable costs in Minnesota were not included, due to inadequate data:
  - Impact of secondhand smoke exposure on population health and spending
  - Costs of long-term health and development impact of premature/low birth-weight births from smoking during pregnancy
  - Costs from deaths or property damage from smoking-related fires

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WHERE WE GO FROM HERE

- Despite recent improvement in smoking status, smoking continues to impose a substantial burden on the state of Minnesota
- In 2014:
  - 6,312 smoking-attributable deaths
  - $3.2 billion in smoking-attributable expenditures on medical care services
    - Approximately $593 per capita
- These are conservative estimates of total smoking cost, given omission of many potentially substantial sources of smoking cost
- Continuing efforts to prevent youth initiation and increase adult smoking cessation needed to reduce future costs of smoking in Minnesota

COMMENTS / QUESTIONS?