

Tobacco Is Killing and Costing Us

2002-2006

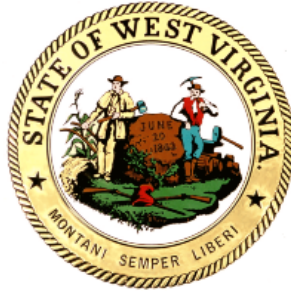


June 2009



*West Virginia Bureau for Public Health
Health Statistics Center
350 Capitol Street, Room 160
Charleston, WV 25301*

*Joe Manchin III, Governor
Martha Yeager Walker, Secretary*



TOBACCO IS KILLING AND COSTING US

A Report on Tobacco Use Rates, Smoking-Related Deaths, and Smoking-Related Health Care and Other Costs In West Virginia, 2002-2006

June 2009

**Joe Manchin III
Governor**

**Martha Yeager Walker
Secretary, Department of Health and Human Resources**

**Chris Curtis, MPH
Acting Commissioner, Bureau for Public Health**

**Nancye Bazzle, MPH
Deputy Commissioner, Bureau for Public Health**

**Catherine Slemple, MD, MPH
Acting State Health Officer, Bureau for Public Health**

“Smoking remains the leading cause of preventable death and has negative health impacts on people at all stages of life. It harms unborn babies, infants, children, adolescents, adults, and seniors.”

--- former U.S. Surgeon General Richard Carmona, MD, MPH

Office of Community Health Systems and Health Promotion

Joe Barker, MPA
Director, Office of Community Health Systems and Health Promotion

Chuck Thayer, MS
Associate Director, OCHSHP

Bruce Adkins, MS, PA
Director, Division of Tobacco Prevention

Health Statistics Center

Daniel Christy, MPA
Director, Health Statistics Center

James Doria
Manager, Statistical Services and Chronic Disease Epidemiology Unit

Amy Wenmoth, MA
Manager, Chronic Disease Epidemiology Unit

Kathi Elkins, MBA
Tobacco Prevention Epidemiologist

Tom Light
Statistical Services Programmer

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For additional information, contact:
West Virginia Health Statistics Center
(304) 558-9100
West Virginia Division of Tobacco Prevention
(304) 558-2939

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TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	IV
INTRODUCTION.....	1
SECTION 1: Tobacco Use Prevalence in West Virginia.....	2
SECTION 2: Cigarette Consumption in West Virginia.....	9
SECTION 3: Smoking-Attributable Mortality and Years of Potential Life Lost in West Virginia.....	11
SECTION 4: Smoking-Attributable Direct Health Care Costs and Productivity Losses in West Virginia.....	17
SECTION 5: Tax Issues That Relate to Tobacco Use in West Virginia.....	24
CONCLUSION.....	26
REFERENCES.....	28
APPENDIX A: Tables.....	31
Table A1: Estimated Annual Smoking-Attributable Mortality (SAM), Rate of Death by SAM, and Years of Potential Life Lost (YPLL) by SAM, for Adults Age 35+ by State	
Table A2: Reference Populations	
APPENDIX B: Methodology.....	33
The detailed methodology for this report can be accessed in a separate, supporting document available online at the Health Statistics Center (http://www.wvdhhr.org/bph/hsc) or the Division of Tobacco Prevention (www.wvntp.org) websites. Any questions concerning the methodology used in this report should be directed to Daniel Christy, Director, Health Statistics Center.	

EXECUTIVE SUMMARY

The West Virginia Division of Tobacco Prevention (DTP) collaborates with state and federal partners to promote tobacco use prevention, cessation, and smoke-free air in West Virginia schools, businesses, health care settings, and communities. In recent years, significant successes have been achieved in reducing smoking among youth and implementing clean indoor air policies across the state. According to the U. S. Centers for Disease Control and Prevention (CDC), sustained investments in comprehensive tobacco control programs can decrease smoking prevalence, prevent millions of premature deaths, and save the country billions of dollars (1). DTP and the West Virginia Health Statistics Center (HSC) collaborated to publish *Tobacco Is Killing (and Costing) Us* in 2002 and 2005 to outline the burden of tobacco use in West Virginia. This summary presents key findings from the third edition, reporting county and state data from 2002-2006, as well as selected 2007 state data.

Cigarette Smoking

West Virginia continues to have one of the highest rates of cigarette smoking in the country. Despite successes in reducing smoking among West Virginia youth, there have yet to be any significant declines in smoking among West Virginia adults.

- In 2007, approximately 26.9% (387,000) of West Virginia adults were current cigarette smokers---the second highest rate among the 50 states and D.C., and significantly higher than the U. S. average of 19.7% (Behavioral Risk Factor Surveillance System [BRFSS], 2007).
- In the years 2002-2006, adult cigarette smoking ranged from a high of approximately 42.4% in Wyoming County to a low of 19.5% in Monongalia County.
- Between 2000 and 2007, the percentage of West Virginia youth who were current smokers significantly decreased from 38.5% to 28.8%, while the percentage who never smoked a cigarette significantly increased from 25.7% to 38.9% (2007 WV Youth Tobacco Survey).

Smoking-Related Deaths

Cigarette smoking harms nearly every organ in the body and causes 443,000 deaths each year in the United States. Smoking is the primary cause of at least 30% of all cancer deaths, and of nearly 80% of deaths from chronic lower respiratory disease and early cardiovascular disease (2).

In each year from 2002 through 2006:

- An average of 3,785 West Virginians age 35 and older died of diseases related to cigarette smoking.
- About 19% of all deaths (or nearly 1 in 5) of adults age 35 and older were caused by cigarette smoking. The average rate of smoking-attributable mortality was 378 deaths per 100,000 people---one of the highest rates among all the states.
- The percentage of deaths caused by smoking ranged from a high of nearly 23% in Lincoln County to a low of 14% in Pendleton County.

Years of Potential Life Lost (YPLL)

Smoking remains a leading cause of preventable death and disease in West Virginia and the United States. In fact, nearly half of the 44.5 million Americans who smoke will die prematurely of tobacco-related disease. YPLL is a measure of the number of years of life lost due to death before the age of 75 and is an indicator of premature and preventable mortality.

In each year from 2002 through 2006:

- An average of 8,400 West Virginia adults age 35-74 died, resulting in 116,400 years of potential life lost before the age of 75.

- An average of nearly 55,000 years of potential life was lost among adults age 35-74 due to premature death caused by cigarette smoking. This equals 47% of all years of potential life lost among this group.
- Every smoker who died lost an average of 14 years of life due to premature death.

Smoking-Related Economic Costs to West Virginia

Smoking-related economic costs can be separated into 1) direct health care costs related to cigarette smoking and 2) productivity losses due to smoking-related deaths. Combined, these smoking-related costs totaled between \$1.98 billion and \$2.39 billion among West Virginia adults in 2006.

- In 2006, smoking-related direct health care costs totaled \$1.3 billion. This equaled \$3,388 per every adult smoker or \$718 per every West Virginia resident. The per capita cost of smoking-related health care was highest in Wyoming County (\$1,201 per resident) and lowest in Monongalia County (\$512 per resident).
- In each year from 2002 through 2006, annual productivity losses due to smoking-related deaths among adults age 35 and older averaged \$1.09 billion. This equaled \$2,848 per every adult smoker or \$605 per every West Virginia resident.
- Total smoking-related health care costs and productivity losses equaled \$6,236 annually per adult smoker or \$1,323 per every West Virginia resident.
- Each West Virginia adult age 35 and older who died from a smoking-related illness represented a loss of nearly \$288,000 in wages and future earnings.

Other Tobacco Use Issues

- From 2000 through 2004, approximately 16.9% (111,700) of adult men were using smokeless tobacco products, ranking West Virginia #2 among the 14 states monitoring this behavior (3).
- The cigarette excise tax was increased from \$0.17 to \$0.55 per pack effective May 2003 (4). The annual tax revenue from cigarettes was about \$32 million in 2002 but jumped dramatically to \$103 million in 2003 after the tax increase (5). The average smoker in West Virginia smokes about 1.4 packs per day, or about 500 packs per year (6).

INTRODUCTION

Tobacco use is the leading cause of preventable disease and death in the United States and in West Virginia. Smoking does damage at all stages of life---it harms unborn babies, infants, children, adolescents, adults, and seniors. Cigarette smoking harms nearly every organ in the body and can cause cancers, chronic lung diseases, coronary heart and cardiovascular diseases, reproductive conditions including infertility and low birthweight infants, and has been linked to Sudden Infant Death Syndrome (7). Since 1998, when state Attorney General Darrell McGraw and the West Virginia Legislature accepted the state's share of the Tobacco Master Settlement Agreement, more than 40,000 West Virginia residents have died of smoking-related illnesses. On average, 10 West Virginians die every day because they smoked cigarettes. That's nearly 3,800 persons annually, or 1 in 5 deaths caused by smoking.

This revised 2009 report, analyzing data from 2002 through 2006, shows a staggering, unrelenting health epidemic with an escalating price tag. In dollars alone, the direct health care costs of cigarette smoking in the state of West Virginia are \$1.3 billion. Combined with mortality-related productivity losses of \$1.1 billion, the total smoking-related economic burden is **\$2.4 billion annually**. While these data are estimates, they are conservative and do not take into account indirect health care costs, indirect costs from morbidity-related lost productivity, or costs associated with maternal smoking, fire-related deaths, secondhand smoke, or with any other forms of tobacco use such as snuff, snus, chewing tobacco, pipes, and cigars.

The model for state tobacco prevention and control programs developed by the CDC clearly outlines that sustained and targeted evidence-based strategies, implemented at multiple layers within the community, are necessary to affect social change (1). The State has made significant strides in tobacco prevention and cessation efforts, but this report shows that much more needs to be done.

The purpose of this report is to provide West Virginia state and county estimates of 1) tobacco use prevalence, 2) cigarette consumption, 3) smoking-related deaths, and 4) smoking-related economic costs. This information can be used by state and local leaders, public health and medical professionals, and health advocacy groups to guide program efforts in tobacco prevention and cessation, chronic disease prevention, and health promotion.

SECTION I: Tobacco Use Prevalence in West Virginia

- Historically, when compared with the rest of the nation, West Virginia has had very high rates of cigarette smoking and smokeless tobacco use.
- Since 2000, the prevalence of cigarette smoking has significantly declined among West Virginia youth.
- While there have been significant declines in cigarette smoking among adults nationwide, there has been no significant decrease in the adult smoking rate in West Virginia.
- Cigarette smoking is most common in the southwestern and central counties of the state.
- There have been no significant declines in smokeless tobacco use among males, both adult and youth, and the rates remain high.

Cigarette Smoking

In 2007, according to data from the Behavioral Risk Factor Surveillance System (BRFSS), more than 1 in 4 West Virginia youth and adults were current cigarette smokers, including 26.9% (387,000) of adults (8), 28.8% (23,000) of public high school students (see Figure 1), and 11.1% (7,000) of public middle school students (9).

In the years 2001 through 2007, West Virginia's prevalence of adult cigarette smoking ranked in the top three among the 50 states and D.C. During this same time period, the prevalence of smoking among adults was significantly higher in West Virginia than the United States. In 2007, the West Virginia adult rate of smoking was 26.9%, significantly greater than the U. S. rate of 19.5% (8).

There have been no significant decreases in cigarette smoking among West Virginia adults (see Figure 1). Nationwide, the prevalence of adult smoking significantly declined between 1998 and 2004 (from 22.9% to 20.8%) and again between 2004 and 2006 (from 20.8% to 19.7%) (8).

West Virginia Adult Current Cigarette Smoking Rankings	
<u>Year</u>	<u>Rank*</u>
1998	3rd
1999	6th
2000	6th
2001	3rd
2002	3rd
2003	2nd
2004	2nd
2005	3rd
2006	2nd
2007	2nd

* The rank of West Virginia's prevalence among the 50 states and D.C. The 2004 ranking excludes Hawaii. Data

The geographic disparities in smoking among West Virginia adults indicate that smoking is higher in the northern panhandle and southwestern and central counties (see Figure 2 and Table 1). In the years 2002-2006:

- The prevalence of cigarette smoking among adults ranged from a low of 19.5% in Monongalia County to a high of 42.4% in Wyoming County.
- Four counties/regions had smoking prevalences significantly higher than the West Virginia prevalence of 27.0%: Wyoming (42.4%), Mingo (38.1%), and Mason counties (35.6%), and the Calhoun, Clay, Gilmer, and Roane county region (34.3%).
- Monongalia County (19.5%) and the Hardy, Pendleton, and Pocahontas county region (20.5%) had significantly lower prevalences of cigarette smoking than West Virginia average.

Recent tobacco prevention efforts in West Virginia have been successful in reducing the prevalence

of youth cigarette smoking. Between 2000 and 2007, the percentage of public high school students who had *never* tried a cigarette significantly increased (from 25.7% to 38.9%), while the prevalence of current cigarette smokers significantly decreased (from 38.5% to 28.8%). The smoking rate among middle school students significantly decreased from 18.1% in 2000 to 11.1% in 2007 (9) (10). Even with these significant decreases, West Virginia's youth smoking rates still rank among the highest in the U. S. (11).

Smokeless Tobacco Use

Smokeless tobacco use is significantly higher among males than females. In 2004 (the most recent data available), 8.1% of all West Virginia adults were current smokeless tobacco users, composed of 0.4% of women and 16.6% of men (3). West Virginia had the 2nd highest prevalence of smokeless tobacco use among the 14 states reporting data. There have been no significant declines in smokeless tobacco use among West Virginia adult males (see Figure 3).

The prevalence of smokeless tobacco use among West Virginia adult males was highest in the central and eastern portions of the state (see Figure 4, Table 2). In 2000-2004:

- 16.9% of the males were current smokeless tobacco users, with county/region prevalences ranging from a low of 6.7% in Jefferson County to a high of 37.0% in the Calhoun, Clay, Gilmer, and Roane Counties region.
- Three county/regions had prevalences that were significantly higher than the total West Virginia prevalence of 16.9%: the Calhoun, Clay, Gilmer, and Roane Counties region (37.0%); the Braxton, Nicholas, and Webster Counties region (28.3%); and the Hardy, Pendleton, and Pocahontas Counties region (27.1%).
- Jefferson County (6.7%), Hancock County (7.1%), Cabell County (9.7%), and Berkeley County (9.9%) had significantly lower prevalences of smokeless tobacco use than the West Virginia average.

Smokeless tobacco use is higher among youth than adults. In 2007, more than 1 out of 5, or 26.6% of West Virginia high school males (see Figure 3) and 3.1% of high school females, were current smokeless tobacco users---resulting in a total smokeless tobacco use rate of 15.6% among all West Virginia public high school students (10). There have been no significant declines in smokeless tobacco use among West Virginia youth.

Tobacco Use Disparities and At-Risk Populations

The prevalence of tobacco use differs by demographic and socioeconomic characteristics among West Virginia adults. Tobacco prevention efforts are targeted to those populations with the highest rates of tobacco use or those at high risk for tobacco-related illnesses.

- Age: Rates of cigarette smoking and smokeless tobacco use are approximately two times higher among adults age 18-54 than those age 55 and older (3).
- Low SES: Adults with low socioeconomic status (i.e., high school or less education and an annual household income of less than \$25,000) have a significantly higher prevalence of current cigarette smoking than adults with higher levels of education and income. The prevalence of smokeless tobacco use does not significantly differ by socioeconomic status (3).
- Race: The most recent smoking prevalence estimate for African American adults was 18.3% in 2004-2006, significantly lower than the 31.8% reported in 1998-2000 (12) and significantly lower than the prevalence for all adult West Virginians (26.9% in 2007). Even though their prevalence is lower, African Americans experience a greater health impact from smoking-related

diseases than the general population (13) (see Methodology Section in Appendix B).

- **Pregnant Women:** In each year from 1998 through 2007, more than 26% of women giving birth smoked during pregnancy. Preliminary data indicate that in 2008, 28.3% of mothers smoked during pregnancy. Nationwide, the rate of smoking during pregnancy is 10.7% (14). Reducing the rate of smoking among women of child-bearing age and among pregnant women remains a top priority for West Virginia.

We need to cut smoking in this country and around the world. Smoking is the leading preventable cause of death and disease, costing us too many lives, too many dollars and too many tears. If we are going to be serious about improving health and preventing disease we must continue to drive down tobacco use. And we must prevent our youth from taking up this dangerous habit.

---former United States Health and Human Services Secretary Tommy G. Thompson

Figure 1:

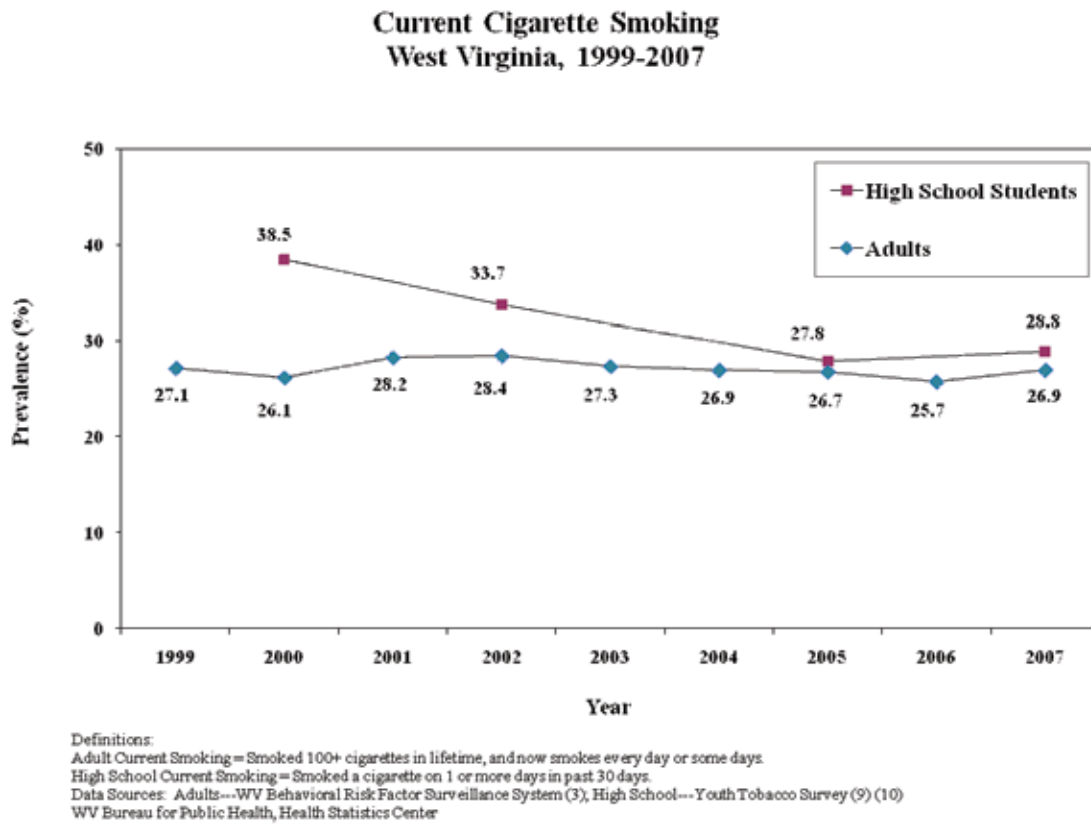
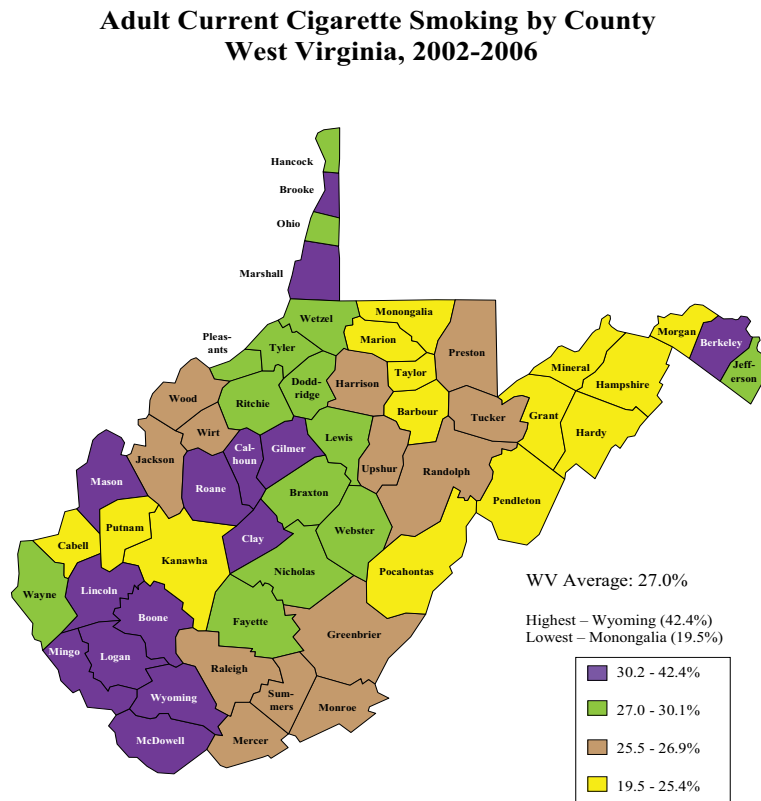


Figure 2:



Note: Some counties are grouped for analysis (see Methodology Section).
 Data Source: WV Behavioral Risk Factor Surveillance System (3) West Virginia Bureau for Public Health, Health Statistics Center

Table 1
Adult Current Cigarette Smoking by County, 2002-2006. BRFSS (3)

County	Prevalence	Rank	Number of Smokers
Barbour	21.3%	34	2,540
Berkeley	30.7%	9	17,370
Boone	32.4%	6	6,350
Braxton	27.2%	16	3,140
Brooke	30.2%	10	6,150
Cabell	23.0%	33	17,880
Calhoun	34.3%	4	1,970
Clay	34.3%	4	2,690
Doddridge	27.0%	18	1,480
Fayette	27.3%	15	10,190
Gilmer	34.3%	4	1,950
Grant	24.9%	30	2,220
Greenbrier	25.6%	26	6,990
Hampshire	24.8%	32	3,770
Hancock	27.1%	17	7,030
Hardy	20.5%	35	2,080
Harrison	26.0%	24	13,770
Jackson	25.5%	27	5,460
Jefferson	29.4%	13	9,490
Kanawha	24.9%	30	39,380
Lewis	27.0%	18	3,600
Lincoln	32.4%	6	5,540
Logan	32.4%	6	9,550
McDowell	33.2%	5	7,010
Marion	25.4%	28	11,480
Marshall	31.9%	8	8,790
Mason	35.6%	3	7,180
Mercer	26.6%	22	13,270
Mineral	24.9%	30	5,140
Mingo	38.1%	2	8,200
Monongalia	19.5%	36	13,130
Monroe	25.6%	26	2,770
Morgan	24.8%	32	2,870
Nicholas	27.2%	16	5,520
Ohio	29.7%	12	11,140
Pendleton	20.5%	35	1,270
Pleasants	30.1%	11	1,740
Pocahontas	20.5%	35	1,460
Preston	25.9%	25	5,860
Putnam	25.0%	29	9,720
Raleigh	26.8%	19	16,740
Randolph	26.8%	19	5,910
Ritchie	27.0%	18	2,150
Roane	34.3%	4	4,120
Summers	25.6%	26	2,790
Taylor	21.3%	34	2,660
Tucker	25.9%	25	1,440
Tyler	30.1%	11	2,210
Upshur	26.2%	23	4,770
Wayne	28.9%	14	9,540
Webster	27.2%	16	2,080
Wetzel	30.1%	11	4,020
Wirt	25.5%	27	1,100
Wood	26.8%	19	18,260
Wyoming	42.4%	1	8,470
WV Total	27.0%		383,400

Note: Data from 31 counties were combined into 12 groupings to obtain adequate sample sizes for analysis. Grouped counties share the same prevalence. Counties with the same prevalence share the same rank. Ranking #1=high use rate, #36=low use rate. See Methodology Section in Appendix B for additional details.

Definitions:
Adult Current Smoking = Smoked 100+ cigarettes in lifetime, and now smokes every day or some days.

Example: In Marshall County, 31.9% of the adult men and women aged 18+ indicated that they were current smokers. Marshall County ranks #8 among all the West Virginia counties in its rate of smoking. There are about 8,790 adult smokers in Marshall County.

West Virginia Bureau for Public Health,
Health Statistics Center

Table 2
Adult Male Current Smokeless Tobacco Use by County, 2000-2004, BRFSS (3)

County	Prevalence	Rank	Number of Users
Barbour	21.6%	11	1,200
Berkeley	9.9%	33	2,690
Boone	17.1%	22	1,570
Braxton	28.3%	2	1,580
Brooke	17.7%	18	1,620
Cabell	9.7%	34	3,480
Calhoun	37.0%	1	1,030
Clay	37.0%	1	1,370
Doddridge	19.1%	16	520
Fayette	19.4%	14	3,450
Gilmer	37.0%	1	1,020
Grant	15.3%	24	620
Greenbrier	23.5%	7	2,940
Hampshire	17.6%	19	1,270
Hancock	7.1%	35	860
Hardy	27.1%	3	1,260
Harrison	17.5%	20	4,260
Jackson	21.0%	12	2,120
Jefferson	6.7%	36	1,040
Kanawha	12.5%	31	8,930
Lewis	19.1%	16	1,190
Lincoln	17.1%	22	1,390
Logan	17.9%	17	2,480
McDowell	19.3%	15	1,830
Marion	15.1%	26	3,130
Marshall	13.6%	28	1,740
Mason	23.5%	7	2,230
Mercer	17.2%	21	3,940
Mineral	15.3%	24	1,460
Mingo	16.2%	23	1,580
Monongalia	13.6%	28	4,400
Monroe	23.5%	7	1,050
Morgan	17.6%	19	950
Nicholas	28.3%	2	2,650
Ohio	10.9%	32	1,840
Pendleton	27.1%	3	820
Pleasants	24.2%	6	680
Pocahontas	27.1%	3	940
Preston	24.6%	5	2,600
Putnam	15.3%	24	2,830
Raleigh	22.6%	9	6,580
Randolph	26.3%	4	2,840
Ritchie	19.1%	16	730
Roane	37.0%	1	2,080
Summers	23.5%	7	1,230
Taylor	21.6%	11	1,260
Tucker	24.6%	5	650
Tyler	24.2%	6	850
Upshur	20.3%	13	1,730
Wayne	14.4%	27	2,230
Webster	28.3%	2	1,000
Wetzel	24.2%	6	1,520
Wirt	21.0%	12	440
Wood	12.6%	30	3,940
Wyoming	22.6%	9	2,060
WV Total	16.9%		111,700

Note: Data from 31 counties were combined into 12 groupings to obtain adequate sample sizes for analysis. Grouped counties share the same prevalence. Counties with the same prevalence share the same rank. Ranking #1=high use rate, #36=low use rate. See Methodology Section in Appendix B for additional details.

Definitions:

Adult Male Current Smokeless Tobacco Use = Ever tried smokeless tobacco in the past, and now uses it every day or some days.

Example: In Doddridge County, 19.1% of the adult men aged 18+ indicated that they used some form of smokeless tobacco every day or some days. Doddridge County ranks #16 among all the West Virginia counties in its rate of smokeless tobacco use among men. There are about 520 men who use smokeless tobacco in Doddridge County.

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SECTION 2: Cigarette Consumption in West Virginia

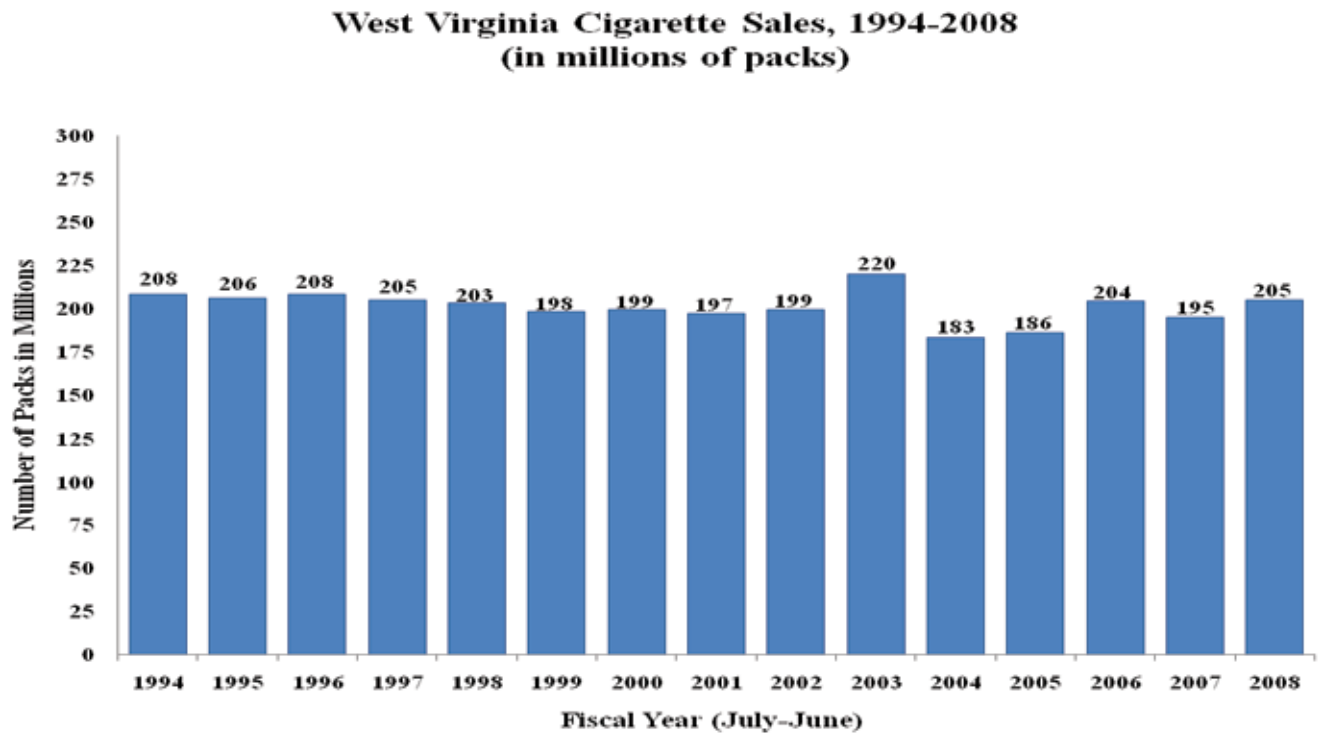
- Total cigarette sales have slowly declined since 1978, but remain at high levels compared with other states.
- West Virginia's annual per capita consumption and per adult smoker consumption of cigarettes are significantly higher than other states and the national average.

Cigarette consumption in West Virginia can be estimated from data collected by the West Virginia State Tax Department, which tracks the number of packs of cigarettes sold annually in the state (5). These data were first collected in FY1948, when West Virginia began assessing a state excise tax of \$0.01 on each pack of cigarettes. The highest number of packs sold was 252 million packs in FY1978. Over the past 15 years, cigarette sales in West Virginia have averaged 201 million packs per year (see Figure 5). A gradual decrease in cigarette sales occurred from FY1994 through FY2002, followed by a sharp hike in FY2003 just prior to West Virginia's tax increase from \$0.17 to \$0.55 per pack (May 2003) (4). Since the lowest sales of 183 million packs in FY2004, cigarette sales have increased to the FY2008 level of more than 200 million packs per year.

In FY2007, 195 million packs of cigarettes were sold in West Virginia; this equals about 111 packs per capita, or approximately 500 packs per adult smoker (about 1.4 packs or 28 cigarettes per day). This compares with U. S. sales of 69 packs of cigarettes per capita, or about 400 packs per adult smoker (about 1.1 packs, or 22 cigarettes per day) (6). In 2008, West Virginia had the 4th highest per capita cigarette sales among the 50 states and D.C., behind Kentucky, Delaware, and New Hampshire (15). Per capita cigarette sales have been higher in West Virginia than the U. S. average since 1990 (see Figure 6).

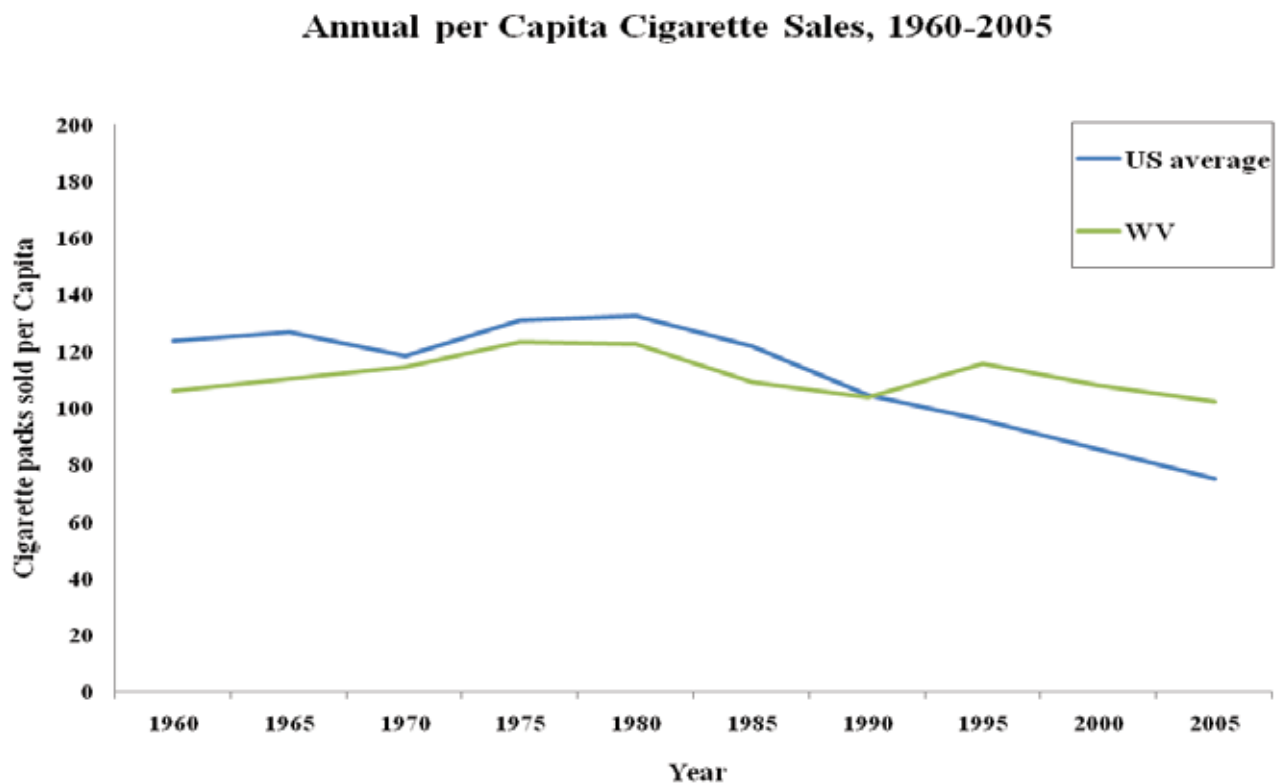
These data suggest that not only does West Virginia have a higher rate of cigarette smoking than most other states, but West Virginia smokers also consume more cigarettes than the average U. S. smoker. (Note: Please refer to Section 5: Tax Issues for information on the relationship between consumption, product price, excise taxes, and tax revenue).

Figure 5:



Data Source: West Virginia State Tax Department (5)
West Virginia Bureau for Public Health, Health Statistics Center

Figure 6:



Data Source: *Tax Burden on Tobacco* (15)
West Virginia Bureau for Public Health, Health Statistics Center

SECTION 3:

Smoking-Attributable Mortality and Years of Potential Life Lost in West Virginia

- During the period 2002 through 2006, about 3,785 lives were lost each year in West Virginia due to cigarette smoking, or about 19% of all deaths in the state among adults age 35 and older.
- Nearly 55,000 years of potential life were lost due to the premature deaths (i.e., those occurring before age 75) caused by smoking. Every smoker who died lost an average of 14 years of life due to premature death. Over 47% of all Years of Potential Life Lost (YPLL) was due to smoking.
- West Virginia had the 2nd highest smoking-related death rate among the 50 states and D.C. in the years 2000-2004.

Cigarette smoking harms nearly every organ in the body and causes 443,000 deaths each year in the United States. Smoking is the primary cause of at least 30% of all cancer deaths, of nearly 80% of deaths from chronic lower respiratory disease (CLRD) and early cardiovascular disease (2). The CDC's Smoking Attributable Mortality, Morbidity, and Economic Costs (SAMMEC) software program can be used to calculate state and county mortality and financial burdens caused by smoking-related cancers and heart and lung diseases (16).¹

Smoking-Attributable Mortality (SAM)

According to SAMMEC (16), from 2002 through 2006 an average of 3,785 West Virginians age 35 and older died each year from diseases related to cigarette smoking (see Table 3).² This equals approximately 19% of deaths, or nearly 1 in every 5 deaths among West Virginia adults age 35 and older during that time period (17). Of the average annual 3,785 smoking-related deaths in West Virginia, 1,531 (40.4%) were caused by cancers, 1,190 (31.4%) were caused by heart diseases, and 1,064 (28.1%) were caused by lung diseases.

On average, 378 per every 100,000 adults age 35 and older died of a smoking-related disease in each of the years from 2002 through 2006. This smoking-attributable death rate is higher than the death rates for 8 of the 10 leading causes of deaths among adults age 35 and older (see Figure 8) (17). In the years 2000-2004, West Virginia had the 2nd highest smoking-attributable death rate among the 50 states and D. C. (see Table A1 in Appendix A) (18).

During 2002 through 2006, the geographic differences in deaths caused by smoking indicate the following:

- There is a greater burden from smoking-related deaths in the central and southwestern counties, as measured by percentage of all deaths (Figure 7 and Table 3).
- The percentage of all deaths caused by smoking (% SAM) ranged from a low of 14.1% in Pendleton County to a high of 22.7% in Lincoln County, with a West Virginia average of 18.9%.
- The counties with the highest % SAM were Lincoln, Mingo, Logan, Doddridge, Roane, and Wayne, all over 21%.
- Pendleton, Barbour, Hardy, Monongalia, Wetzel, and Pleasants counties all had % SAM of 16.5% or lower.
- Comparing Figure 1 with Figure 7, it is not surprising that the counties with high smoking rates also have high SAM death burdens.
- Expressed as a smoking-caused death rate (per 100,000 of the population), the death rates ranged from a low of 249.5 for Monongalia County, to a high of 508.2 for Mingo County; the average for West Virginia was 378.1 (see Table 3).

¹ The SAMMEC methodology has been revised over time; however, the models have produced consistent results and have proven to be a reliable method for estimating smoking-related mortality. The SAMMEC model at present cannot be used to estimate deaths from other tobacco products, secondhand smoke exposure, infant deaths due to maternal smoking, or fire deaths associated with tobacco use.

² Using earlier versions of the SAMMEC model, statewide smoking-attributable deaths were estimated at 4,221 in 1990, 4,240 annually in 1995-1999, and 3,842 annually in 1999-2003.

Smoking-Attributable Years of Potential Life Lost (YPLL)

Smoking remains a leading cause of preventable death and disease in West Virginia and the United States. In fact, nearly half of the 44.5 million Americans who smoke will die prematurely of tobacco-related disease (19). YPLL is a measure of the number of years of life lost due to death before the age of 75, and is an indicator of premature and preventable mortality (16). The 3,785 West Virginians age 35 and older who died from smoking-related diseases in each of the years from 2002 through 2006 lost nearly 55,000 years of potential life (see Table 4). Of the 55,000 smoking-attributable years of potential life lost (SAYPLL), approximately 24,000 (43.7%) were caused by cancers, 18,000 (32.7%) were caused by heart diseases, and 13,000 (23.6%) were caused by lung diseases.

Approximately 47% of all YPLL among adults age 35 and older was attributable to cigarette smoking (see Figure 9 and Table 4). On average, each smoker who died from a smoking-related disease lost 14 years of life due to premature mortality.

Geographic disparities in 2002-2006 suggest the following:

- The central, northern, and Northern Panhandle counties experienced a greater impact of SAYPLL (as % of all YPLL).
- Values for SAYPLL ranged from a low of 39.3% in Hampshire County to a high of 64.1% in Doddridge County, with a West Virginia average of 47.2%.
- The counties with the highest SAYPLL were Doddridge, Brooke, Tyler, Ritchie, and Ohio, all 54.0% or higher.
- The counties with the lowest SAYPLL were Hampshire, Wyoming, McDowell, Hardy, and Barbour, all 41.0% or lower.
- Expressed as a rate (per 100,000 of population), there is a greater YPLL burden in the central and southern counties (see Table 4). The values for counties ranged from a low of 3,517 for Monongalia County to a high of 8,399 for McDowell, compared with a West Virginia average rate of 5,491.

Some may argue that society bears an economic burden when life expectancy is increased, thereby increasing the costs to support the elderly. “The goal of the U.S. health care system is ‘prolonging disability-free life,’ states the 2004 Surgeon General’s Report on the Health Consequences of Smoking, ‘...Thus any negative economic impacts from gains in longevity with smoking reduction should not be emphasized in public health decisions.’

Dr. Terry Pechacek, CDC Associate Director for Science in the Office on Smoking and Health, said that data seeking to quantify economic benefits of smoking couldn’t capture all the benefits associated with longevity, ‘like a grandparent’s contribution to a family. Because of such uncertainties the CDC won’t put a price tag on savings from smoking.’

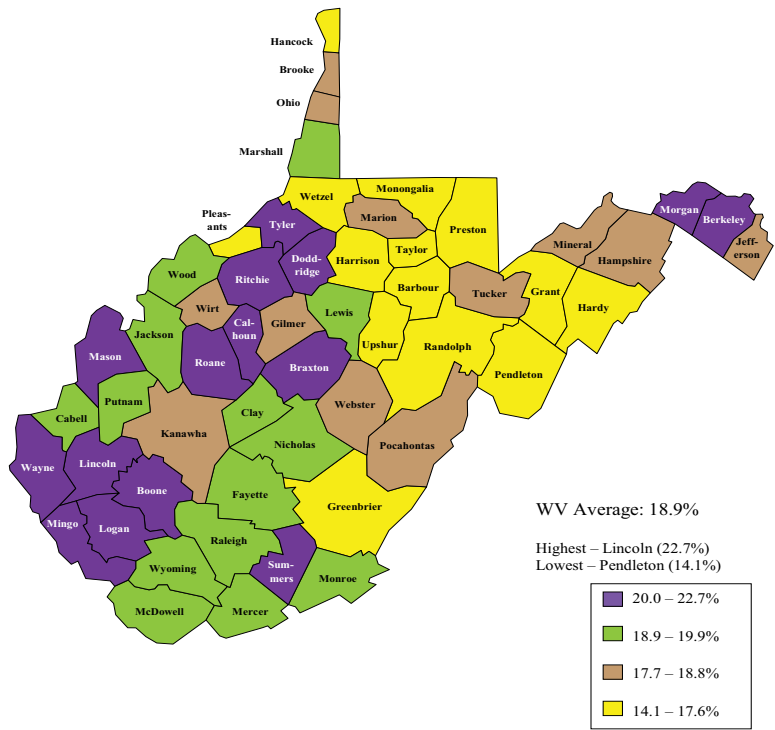
---The Charleston (WV) Gazette, April 28, 2009

“Do smokers cost society money?” Erica Werner (Associated Press)

<http://www.wvgazette.com/ap/Politics/2009040788665>

Figure 7:

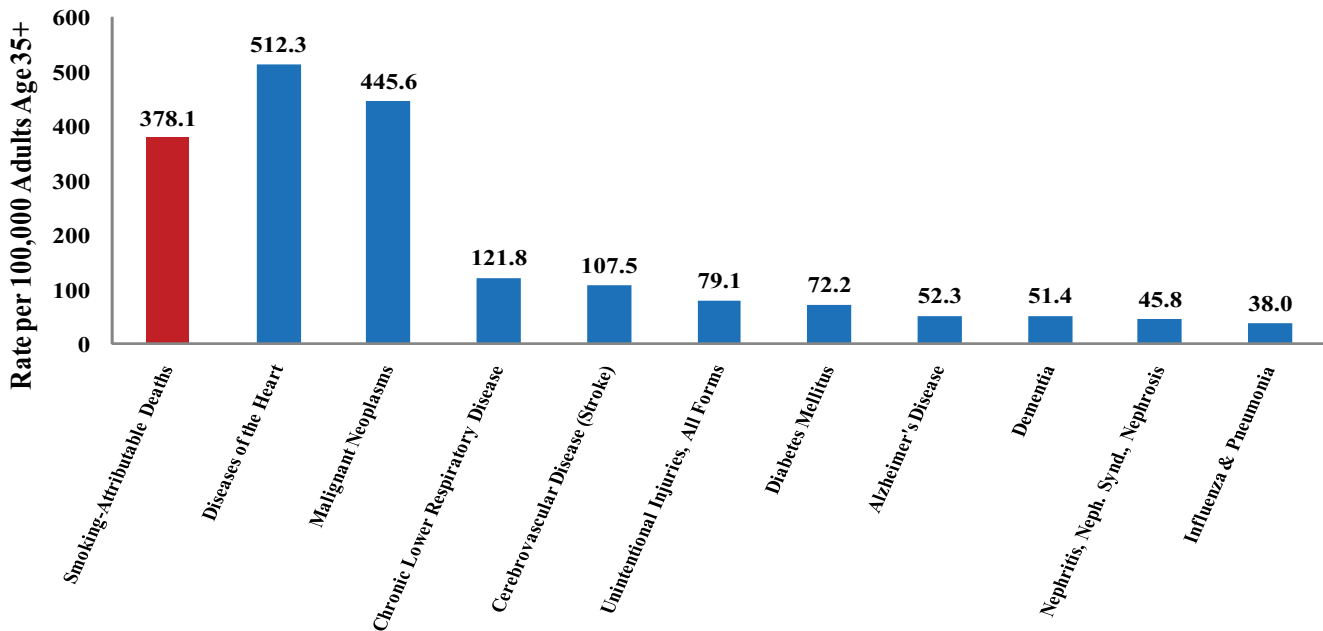
**Percent of Total Annual Deaths Attributable to Smoking
By County, West Virginia, 2002-2006
(adults age 35+)**



Data Source: SAMMEC (16), West Virginia Bureau for Public Health, Health Statistics Center

Figure 8:

**Comparing 2002-2006 Smoking-Attributable Death Rate with 2006
Leading Causes of Death in West Virginia, Adults Age 35+**



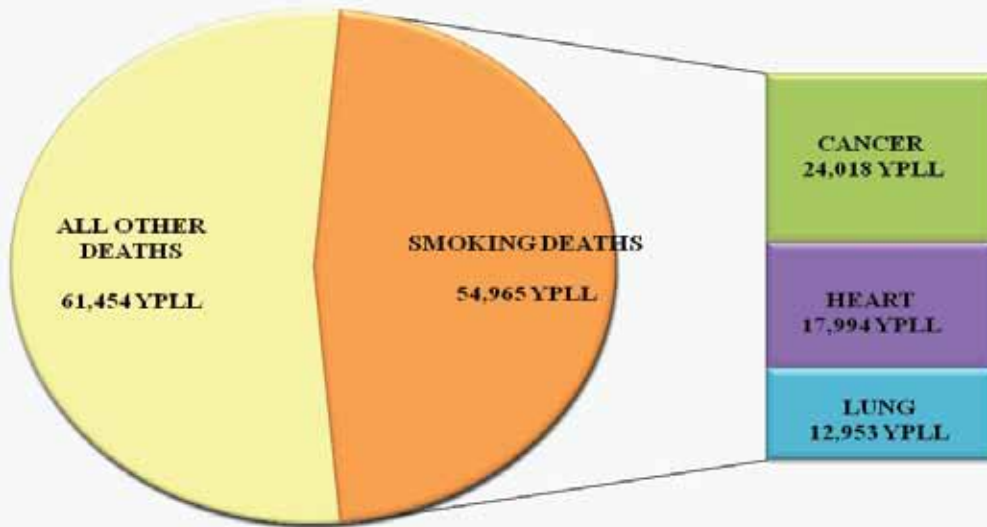
Note: Smoking-attributable causes of death include cancer, heart diseases, and lung diseases. The death rate illustrated here is not a separate cause of death but is shown here for comparison purposes. If smoking were totally eliminated in West Virginia, the smoking-attributable rate of death would eventually reach zero. If this were to happen, the cancer, heart diseases, and lung diseases death rates would decrease significantly, but not be eliminated.

Data Sources: SAMMEC (16) and *West Virginia Vital Statistics, 2006* (17)

West Virginia Bureau for Public Health, Health Statistics Center

Figure 9:

Smoking-Attributable Years of Potential Life Lost (YPLL) Among Adults Age 35-74 in West Virginia, 2002-2006



Data Sources: SAMMEC (16) and *West Virginia Vital Statistics, 2006* (17)
West Virginia Bureau for Public Health, Health Statistics Center

Table 3
Average Annual Smoking-Attributable Deaths (SAM), WV Adults Age 35+, 2002-2006
SAMMEC (16)

County	Smoking-Attributable Deaths (adjusted)				All Deaths 35+	% of All Deaths 35+	% Deaths Rank	SAM Death Rate per 100,000	SAM Death Rate Rank
	Cancer	Heart	Lung	TOTAL					
Barbour	10	9	10	29	185	15.7%	54	341.9	44
Berkeley	62	42	33	137	682	20.1%	12	300.4	50
Boone	28	18	14	60	290	20.7%	8	427.7	8
Braxton	14	9	11	34	167	20.4%	10	407.8	18
Brooke	24	18	16	58	319	18.2%	36	402.6	20
Cabell	84	69	66	219	1,142	19.2%	23	433.2	6
Calhoun	9	4	4	17	85	20.0%	13	397.8	21
Clay	10	6	7	23	116	19.8%	18	423.7	10
Doddridge	7	6	4	17	80	21.3%	4	420.5	11
Fayette	49	33	28	110	577	19.1%	24	417.2	13
Gilmer	6	4	5	15	83	18.1%	38	410.1	16
Grant	7	6	6	19	113	16.8%	49	293.1	51
Greenbrier	27	24	24	75	430	17.4%	47	364.8	36
Hampshire	14	11	11	36	199	18.1%	38	305.7	48
Hancock	29	26	17	72	412	17.5%	45	384.4	26
Hardy	8	8	5	21	133	15.8%	53	283.5	52
Harrison	57	44	44	145	823	17.6%	42	379.6	28
Jackson	25	17	16	58	292	19.9%	16	369.3	35
Jefferson	29	22	17	68	371	18.3%	35	272.2	54
Kanawha	191	139	115	445	2,375	18.7%	30	396.8	22
Lewis	15	13	14	42	220	19.1%	24	428.2	7
Lincoln	23	15	16	54	238	22.7%	1	452.6	4
Logan	45	29	26	100	468	21.4%	3	498.9	3
McDowell	29	23	18	70	352	19.9%	16	499.9	2
Marion	49	39	35	123	690	17.8%	40	388.6	25
Marshall	31	24	19	74	382	19.4%	21	372.7	33
Mason	25	20	16	61	291	21.0%	7	416.9	14
Mercer	57	45	50	152	784	19.4%	21	434.9	5
Mineral	21	17	15	53	299	17.7%	41	354.3	40
Mingo	26	22	25	73	331	22.1%	2	508.2	1
Monongalia	36	33	25	94	591	15.9%	52	249.5	55
Monroe	12	8	8	28	147	19.0%	26	362.5	37
Morgan	18	10	7	35	175	20.0%	13	379.7	27
Nicholas	20	16	19	55	291	18.9%	27	375.1	31
Ohio	44	31	28	103	566	18.2%	36	395.9	23
Pendleton	5	5	3	13	92	14.1%	55	279.6	53
Pleasants	5	5	4	14	85	16.5%	50	340.7	45
Pocahontas	9	6	7	22	118	18.6%	31	408.2	17
Preston	21	19	15	55	314	17.5%	45	331.8	47
Putnam	35	26	27	88	446	19.7%	19	303.8	49
Raleigh	62	59	44	165	871	18.9%	27	374.0	32
Randolph	19	19	19	57	332	17.2%	48	360.5	38
Ritchie	9	8	8	25	122	20.5%	9	424.5	9
Roane	13	10	13	36	170	21.2%	5	418.8	12
Summers	12	9	10	31	155	20.0%	13	370.5	34
Taylor	10	10	11	31	176	17.6%	42	344.3	43
Tucker	7	4	5	16	86	18.6%	31	375.2	30
Tyler	11	7	4	22	109	20.2%	11	406.2	19
Upshur	17	13	14	44	250	17.6%	42	349.6	41
Wayne	42	28	26	96	455	21.1%	6	415.7	15
Webster	9	6	6	21	114	18.4%	34	376.6	29
Wetzel	14	11	8	33	203	16.3%	51	335.2	46
Wirt	5	3	3	11	59	18.6%	31	347.1	42
Wood	65	63	48	176	930	18.9%	27	358.9	39
Wyoming	20	19	15	54	277	19.5%	20	391.4	24
WV Total	1,531	1,190	1,064	3,785	20,063	18.9%		378.1	

SAM Rate is calculated per 100,000 people age 35 and over.

West Virginia Bureau for Public Health, Health Statistics Center

Table 4
Average Annual Smoking-Attributable Years of Potential Life Lost (SAYPLL)
WV Adults Age 35+, 2002-2006, SAMMEC (16)

County	Smoking-Attributable YPLL (adjusted)				All YPLL 35-74	% of All YPLL 35- 74	% YPLL Rank	SAYPLL Rate per 100,000	SAYPLL Rate Rank
	Cancer	Heart	Lung	TOTAL					
Barbour	173	130	109	412	1,005	41.0%	51	4,857.3	43
Berkeley	1,058	729	437	2,224	5,397	41.2%	50	4,875.8	42
Boone	484	291	204	979	2,084	47.0%	30	6,979.4	4
Braxton	236	125	127	488	1,021	47.8%	22	5,852.7	18
Brooke	362	272	184	818	1,427	57.3%	2	5,678.6	20
Cabell	1,276	1,054	789	3,119	6,520	47.8%	22	6,169.5	13
Calhoun	140	52	46	238	451	52.8%	7	5,569.9	23
Clay	157	92	91	340	742	45.8%	39	6,263.8	10
Doddridge	115	106	43	264	412	64.1%	1	6,529.8	6
Fayette	766	512	366	1,644	3,433	47.9%	21	6,235.8	11
Gilmer	91	57	57	205	484	42.4%	48	5,604.2	21
Grant	98	61	82	241	459	52.5%	8	3,718.0	52
Greenbrier	407	348	276	1,031	2,223	46.4%	38	5,015.3	39
Hampshire	223	157	137	517	1,315	39.3%	55	4,390.7	49
Hancock	433	372	209	1,014	2,000	50.7%	11	5,413.8	30
Hardy	120	102	53	275	675	40.7%	52	3,712.2	53
Harrison	874	648	552	2,074	4,402	47.1%	28	5,429.5	29
Jackson	405	242	190	837	1,608	52.1%	9	5,329.2	35
Jefferson	489	361	218	1,068	2,508	42.6%	47	4,274.4	50
Kanawha	2,879	2,111	1,383	6,373	13,572	47.0%	30	5,683.0	19
Lewis	247	186	166	599	1,188	50.4%	13	6,106.6	16
Lincoln	362	241	210	813	1,642	49.5%	15	6,814.8	5
Logan	715	508	314	1,537	3,229	47.6%	25	7,667.4	3
McDowell	536	393	247	1,176	2,896	40.6%	53	8,398.8	1
Marion	708	561	377	1,646	3,244	50.7%	11	5,200.6	37
Marshall	461	379	235	1,075	1,999	53.8%	6	5,413.7	31
Mason	384	308	191	883	1,875	47.1%	28	6,034.3	17
Mercer	874	693	601	2,168	4,621	46.9%	33	6,203.3	12
Mineral	293	230	166	689	1,608	42.8%	46	4,606.2	48
Mingo	451	405	339	1,195	2,553	46.8%	35	8,319.4	2
Monongalia	584	466	275	1,325	3,042	43.6%	43	3,517.1	55
Monroe	198	130	101	429	873	49.1%	16	5,554.1	25
Morgan	295	132	88	515	1,084	47.5%	26	5,587.5	22
Nicholas	324	219	242	785	1,605	48.9%	17	5,354.3	34
Ohio	639	441	318	1,398	2,591	54.0%	5	5,373.0	33
Pendleton	72	53	41	166	368	45.1%	40	3,569.9	54
Pleasants	75	82	59	216	452	47.8%	22	5,256.8	36
Pocahontas	141	74	79	294	676	43.5%	45	5,455.6	28
Preston	345	271	183	799	1,715	46.6%	36	4,819.6	45
Putnam	542	388	289	1,219	2,595	47.0%	30	4,207.7	51
Raleigh	986	910	559	2,455	5,169	47.5%	26	5,565.0	24
Randolph	279	257	217	753	1,692	44.5%	42	4,762.2	46
Ritchie	143	119	99	361	665	54.3%	4	6,130.1	14
Roane	234	148	165	547	1,139	48.0%	20	6,363.4	9
Summers	188	132	130	450	931	48.3%	18	5,377.6	32
Taylor	168	143	135	446	926	48.2%	19	4,952.8	40
Tucker	122	64	47	233	497	46.9%	33	5,464.4	27
Tyler	196	93	59	348	618	56.3%	3	6,425.4	8
Upshur	256	178	173	607	1,306	46.5%	37	4,823.2	44
Wayne	682	460	348	1,490	2,959	50.4%	13	6,452.5	7
Webster	142	87	78	307	682	45.0%	41	5,505.7	26
Wetzel	212	159	83	454	1,042	43.6%	43	4,611.5	47
Wirt	82	30	48	160	377	42.4%	48	5,048.9	38
Wood	963	909	551	2,423	4,686	51.7%	10	4,940.8	41
Wyoming	333	323	187	843	2,136	39.5%	54	6,110.9	15
WV Total	24,018	17,994	12,953	54,965	116,419	47.2%		5,491.4	

SAYPLL Rate is calculated per 100,000 people age 35+.

West Virginia Bureau for Public Health, Health Statistics Center

SECTION 4:

Smoking-Attributable Direct Health Care Costs And Productivity Losses in West Virginia

- Direct health care costs attributable to cigarette smoking amounted to \$1.3 billion in West Virginia in 2006. This equaled about \$718 per capita, or \$3,388 per adult smoker.
- West Virginia experienced economic losses of \$1.092 billion in 2006 due to smoking-attributable productivity losses (SAPL) --- losses caused by premature mortality. Each West Virginia adult age 35 and older who died from a smoking-related illness represented a loss of about \$288,000 in wages and future earnings.
- The total annual economic costs due to smoking in West Virginia are estimated at \$2.39 billion for 2006. Total annual costs per smoker amounted to \$6,236, and total annual costs per capita are estimated to be \$1,323.
- Each pack of cigarettes sold in West Virginia represented an economic burden of \$11.70.

Smoking-Attributable Direct Health Care Costs

The West Virginia Health Statistics Center (HSC) relied upon the work of two noted researchers in estimating smoking-attributable direct health care costs. Vincent Miller (20) and Leonard Miller (21) (not related) independently developed two models for estimating health care costs related to cigarette smoking. These models are based on smoking-attributable fractions (SAFs), which are the proportion of the average medical care expenditure for a specific category (e.g., hospital care, ambulatory care, or prescription drugs) that is due to cigarette smoking. SAFs were applied to West Virginia health care expenditures (22), and medical services inflation rates were applied to estimate smoking-attributable direct health care costs (23). Additional information about these models and the calculation of direct health care costs can be found in the Methodology Section in Appendix B. In this report, Model 1 refers to Vincent Miller et al., and Model 2 refers to Leonard Miller et al.

West Virginia's total smoking-attributable direct health care costs for 2006 are estimated to be between \$0.891 billion (Model 1), and \$1.299 billion (Model 2) (see Figure 10). This equals as much as \$718 per West Virginia resident, or \$3,388 per adult smoker (see Table 5). Between 1998 and 2006, smoking-attributable direct health care costs increased approximately 60%, mostly reflecting the inflation of health care costs during this time (see Figure 10). Because of the latency of smoking-related diseases, these annual health care costs will continue to remain high for many years even *if* smoking rates were to dramatically decrease in the near future. Referring to Figure 1, this does not seem to be the forecast for West Virginia.

Geographical disparities in the 2006 smoking-related direct health care costs (using Model 2) include:

- The central and southern counties had greater per capita health care costs (see Figure 11 and Table 5) than other regions of the state.
- The county per capita health care costs ranged from a low of \$512 in Monongalia County to a high of \$1,201 in Wyoming County.
- The counties with the highest per capita costs were Wyoming, Mingo, McDowell, Gilmer and Mason, all in excess of \$950 per capita.
- The counties with the lowest per capita costs were Monongalia, Hardy, Pendleton, Barbour, Taylor, Pocahontas, and Hampshire, all below \$600.

Smoking-Attributable Productivity Losses (SAPL)

SAPL is calculated by SAMMEC software (16), and is defined as the present value of foregone future earnings from paid labor and the value of foregone future imputed earnings from unpaid household work, due to premature death from smoking-related diseases (24). West Virginia experienced economic losses of \$1.092 billion in 2006 due to SAPL (see Table 6 and Methodology Section in Appendix B). This equaled approximately

\$605 per West Virginia resident, or \$2,848 per adult smoker.

Of the \$1.092 billion in losses, approximately \$505 million (46.2%) was attributable to cancer deaths, \$390 million (35.7%) was attributable to heart disease deaths, and \$197 million (18.0%) was attributable to lung disease deaths. The SAPL costs are directly related to the 3,785 people who died prematurely from smoking; each of these smokers represented over \$288,000 in lost wages and future earnings.

SAPL costs differ by county and region (see Table 6 and Figure 12). In 2006:

- The per capita SAPL ranged from a low of \$301 for Monongalia County to a high of \$1,097 for McDowell County.
- The counties with the highest per capita SAPL were McDowell, Mingo, Logan, Boone, and Tyler, all over \$800 per capita.
- The counties with the lowest per capita SAPL were Monongalia, Grant, Hardy, and Pendleton, all less than \$400 per capita.
- Expressed as SAPL per adult smoker, the southern and northcentral counties experienced higher costs (see Figure 13 and Table 6). SAPL per adult smoker ranged from a low of \$1,745 in Grant County to a high of \$3,808 in McDowell County.

Total Smoking-Attributable Economic Costs for West Virginia

The total annual economic costs due to smoking in West Virginia were estimated at \$2.39 billion in 2006,³ based on the direct health care costs (Model 2) and productivity losses presented earlier (see Figure 14). Total annual costs per smoker amounted to \$6,236 (direct health care costs of \$3,388, plus SAPL of \$2,848), and total annual costs per capita were estimated to be \$1,323 (direct health care costs of \$718 plus SAPL of \$605) (see Figure 15, Table 5, and Table 6). Based on the total annual costs (\$2.39 billion) and the number of packs sold (204 million), the actual economic burden represented by each pack of cigarettes sold in West Virginia was approximately \$11.70 in 2006 (5).

The smoking-attributable costs presented in this report do not include the costs of productivity losses due to morbidity from smoking-related illness, nor do they include the costs of health care or productivity losses due to smokeless tobacco, cigars, pipes, secondhand smoke, fire-related deaths, or maternal smoking.

Employment and Smoking-Attributable Costs

The direct health care costs and productivity losses estimated in this report do not directly impact employers in West Virginia, but there are other serious, smoking-related costs to the business sector, including higher medical costs and higher health care and worker's compensation premiums for employees who smoke (25).

Other costs related to tobacco use include residential and commercial property losses from smoking-caused fires; extra cleaning and maintenance costs made necessary by tobacco smoke and litter; and additional productivity losses due to smoke breaks and smoking-related morbidity (26).

With the exception of a few counties and some business sectors, most employment settings in West Virginia are smoke-free (as of April 1, 2009). About 87% of all state residents live in counties where the Clean Indoor Air regulation prohibits smoking in most workplaces, including restaurants but excluding bars (27). While this report does not cover the burden of secondhand smoke exposure, any exposure in the work and/or home setting may also translate to lower worker productivity and higher medical care costs.

³ In an earlier version of this report, total economic costs were estimated to be \$2.08 billion in 2004 (\$1.012 billion in productivity losses and \$1.064 billion in direct health care costs).

Figure 10:

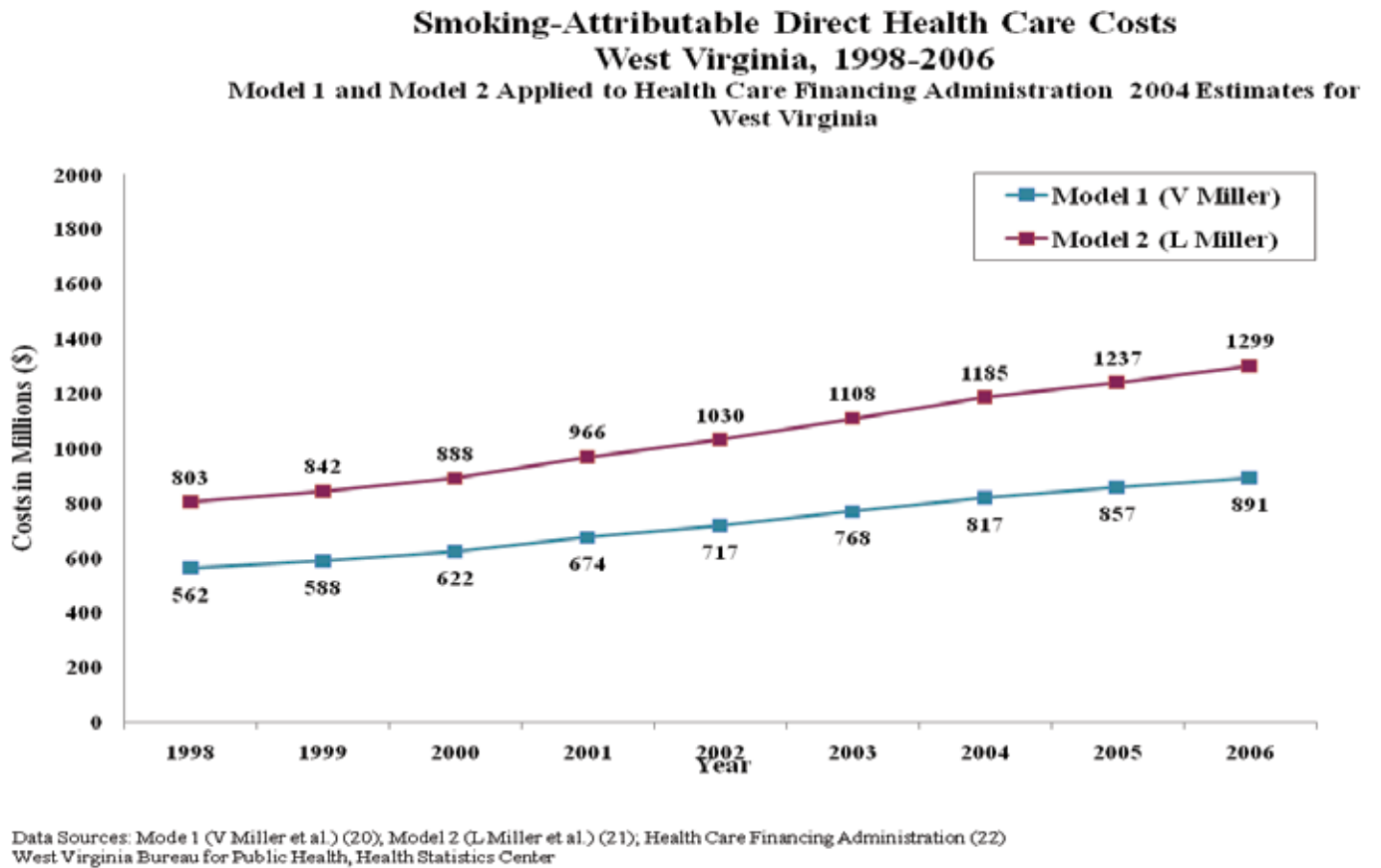


Figure 11:

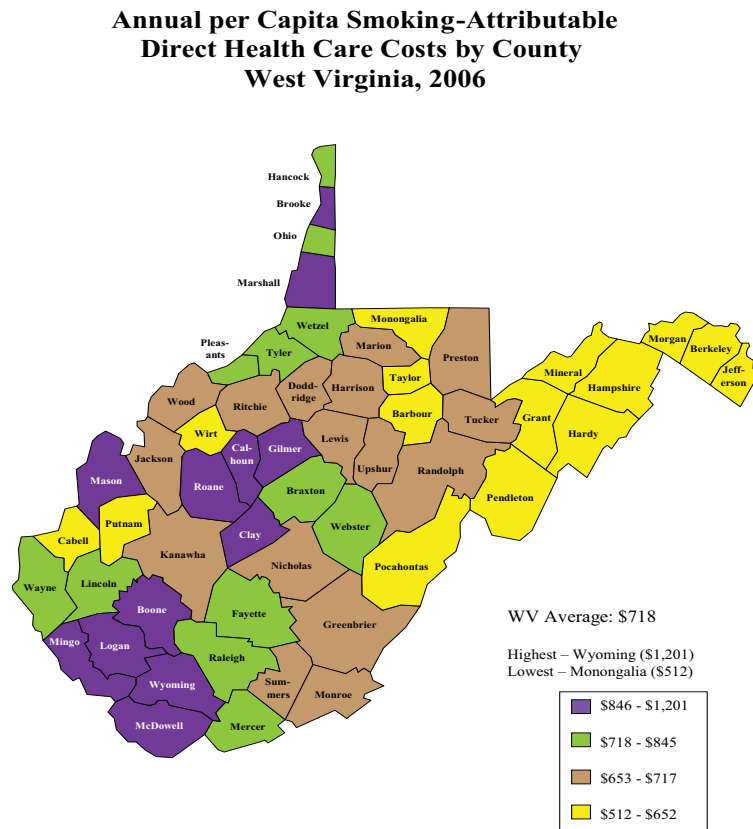
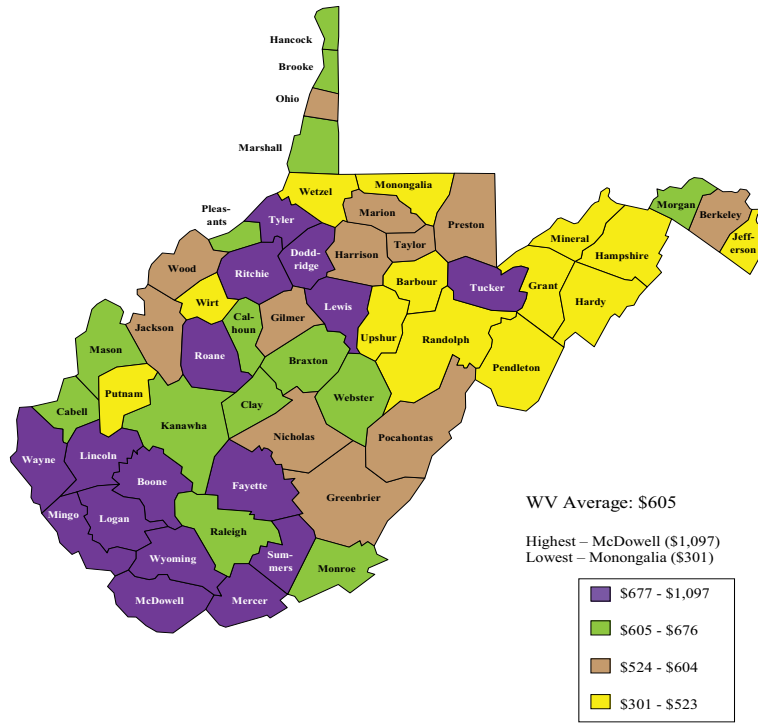


Figure 12:

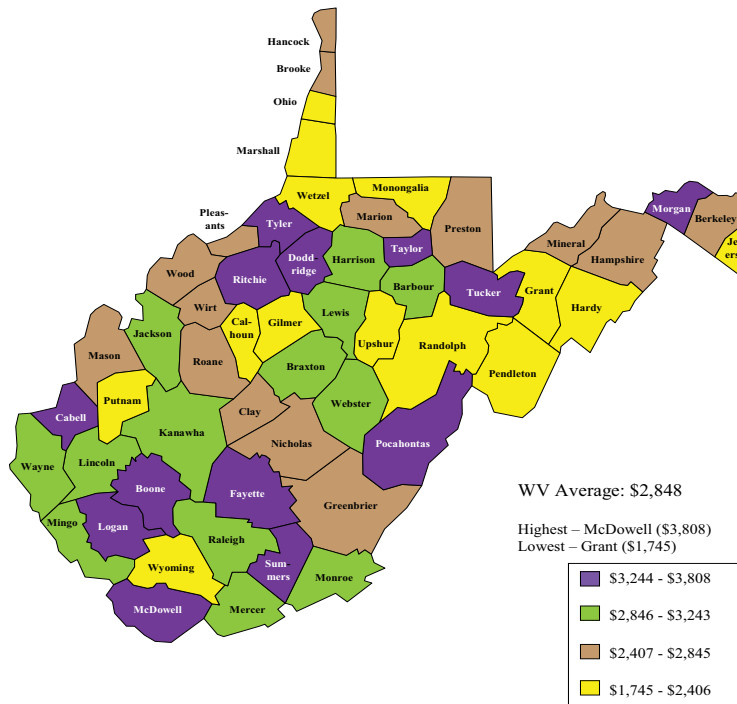
Annual per Capita Smoking-Attributable Productivity Losses by County West Virginia, 2006



Data Source: SAMMEC (16), West Virginia Bureau for Public Health, Health Statistics Center

Figure 13:

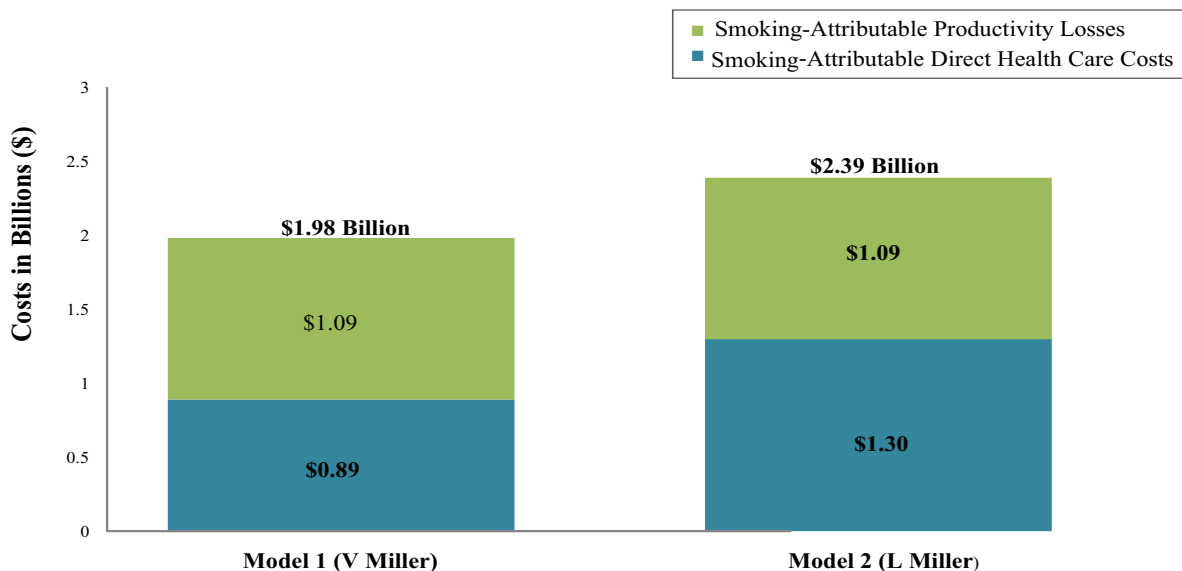
Average Annual Smoking-Attributable Productivity Losses Per Adult Smoker by County West Virginia, 2006



Data Source: SAMMEC (16), West Virginia Bureau for Public Health, Health Statistics Center

Figure 14:

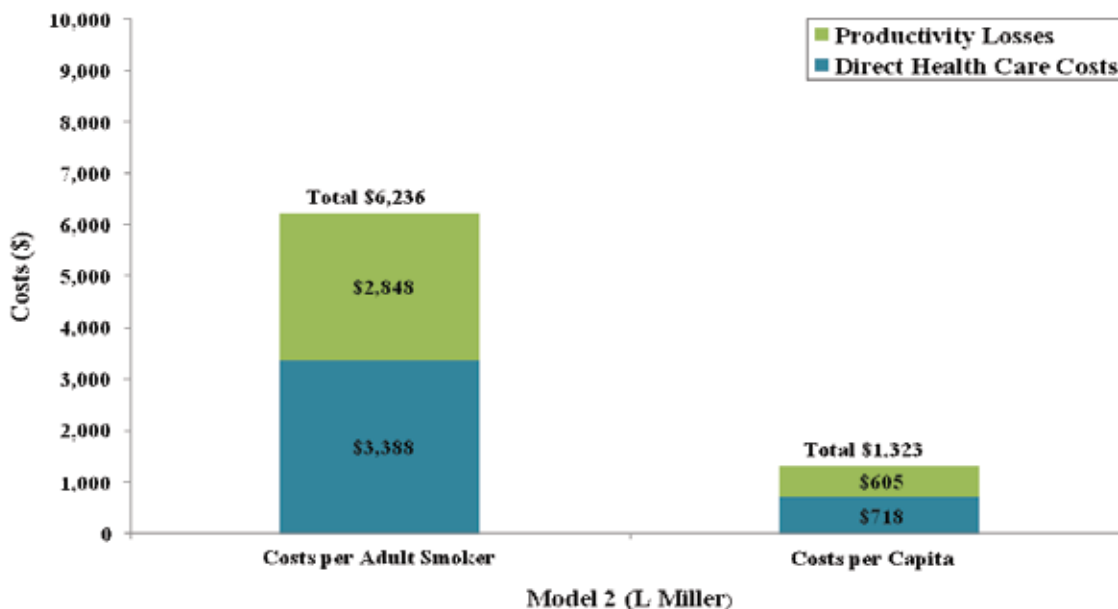
Total Annual Smoking-Attributable Economic Costs West Virginia, 2006



Data Sources: V Miller et al. (20), and L Miller et al. (21)
West Virginia Bureau for Public Health, Health Statistics Center

Figure 15:

Total Annual Smoking-Attributable Economic Costs Per Adult Smoker and per Capita West Virginia, 2006



Data Source: L Miller et al. (21)
West Virginia Bureau for Public Health, Health Statistics Center

Table 5
Direct Health Care Costs of Smoking-Attributable Death/Diseases
for WV Adults, 2006

County	Model 1: Vicent Miller (20)		Model 2: Leonard Miller (21)		
	\$ by Smokers	per Capita	\$ by Smokers	per Capita	per Capita Rank
Barbour	\$5,903,000	\$381	\$8,606,000	\$556	52
Berkeley	\$40,367,000	\$417	\$58,851,000	\$608	46
Boone	\$14,757,000	\$587	\$21,515,000	\$855	12
Braxton	\$7,297,000	\$500	\$10,640,000	\$728	23
Brooke	\$14,292,000	\$598	\$20,837,000	\$871	11
Cabell	\$41,552,000	\$440	\$60,579,000	\$642	44
Calhoun	\$4,578,000	\$632	\$6,675,000	\$921	6
Clay	\$6,251,000	\$621	\$9,114,000	\$906	7
Doddridge	\$3,439,000	\$476	\$5,014,000	\$694	34
Fayette	\$23,681,000	\$511	\$34,525,000	\$745	20
Gilmer	\$4,532,000	\$656	\$6,607,000	\$957	4
Grant	\$5,159,000	\$438	\$7,522,000	\$639	45
Greenbrier	\$16,244,000	\$470	\$23,683,000	\$685	37
Hampshire	\$8,761,000	\$394	\$12,773,000	\$574	49
Hancock	\$16,337,000	\$533	\$23,818,000	\$778	19
Hardy	\$4,834,000	\$358	\$7,047,000	\$522	54
Harrison	\$32,001,000	\$468	\$46,654,000	\$682	38
Jackson	\$12,689,000	\$451	\$18,499,000	\$657	40
Jefferson	\$22,054,000	\$444	\$32,153,000	\$647	42
Kanawha	\$91,517,000	\$477	\$133,424,000	\$695	33
Lewis	\$8,366,000	\$489	\$12,197,000	\$712	27
Lincoln	\$12,875,000	\$577	\$18,770,000	\$841	14
Logan	\$22,194,000	\$621	\$32,356,000	\$906	7
McDowell	\$16,291,000	\$696	\$23,751,000	\$1,015	3
Marion	\$26,679,000	\$472	\$38,895,000	\$688	36
Marshall	\$20,427,000	\$610	\$29,781,000	\$889	10
Mason	\$16,686,000	\$653	\$24,327,000	\$952	5
Mercer	\$30,839,000	\$505	\$44,960,000	\$736	21
Mineral	\$11,945,000	\$447	\$17,415,000	\$652	41
Mingo	\$19,056,000	\$714	\$27,782,000	\$1,041	2
Monongalia	\$30,513,000	\$351	\$44,486,000	\$512	55
Monroe	\$6,437,000	\$478	\$9,385,000	\$697	32
Morgan	\$6,670,000	\$412	\$9,724,000	\$601	48
Nicholas	\$12,828,000	\$490	\$18,702,000	\$714	26
Ohio	\$25,889,000	\$580	\$37,744,000	\$845	13
Pendleton	\$2,951,000	\$380	\$4,303,000	\$554	53
Pleasants	\$4,044,000	\$559	\$5,895,000	\$815	17
Pocahontas	\$3,393,000	\$390	\$4,947,000	\$569	50
Preston	\$13,618,000	\$452	\$19,854,000	\$659	39
Putnam	\$22,589,000	\$415	\$32,932,000	\$605	47
Raleigh	\$38,903,000	\$494	\$56,717,000	\$721	24
Randolph	\$13,735,000	\$485	\$20,024,000	\$706	30
Ritchie	\$4,996,000	\$481	\$7,284,000	\$701	31
Roane	\$9,575,000	\$621	\$13,959,000	\$905	9
Summers	\$6,484,000	\$486	\$9,453,000	\$709	28
Taylor	\$6,182,000	\$384	\$9,012,000	\$559	51
Tucker	\$3,346,000	\$485	\$4,879,000	\$708	29
Tyler	\$5,136,000	\$564	\$7,488,000	\$822	15
Upshur	\$11,085,000	\$472	\$16,161,000	\$689	35
Wayne	\$22,170,000	\$534	\$32,323,000	\$779	18
Webster	\$4,834,000	\$505	\$7,047,000	\$736	21
Wetzel	\$9,342,000	\$561	\$13,620,000	\$818	16
Wirt	\$2,556,000	\$442	\$3,727,000	\$644	43
Wood	\$42,435,000	\$492	\$61,867,000	\$717	25
Wyoming	\$19,684,000	\$823	\$28,697,000	\$1,201	1
WV Total	\$891,000,000	\$493	\$1,299,000,000	\$718	

For Model 2, the cost in 2006 per adult smoker (18+) in West Virginia is \$3,388.
West Virginia Bureau for Public Health, Health Statistics Center

Table 6
Average Annual Smoking-Attributable Productivity Losses (SAPL), WV Adults Age 35+, 2002-2006
SAMMEC (16)

County	Smoking-Attributable Productivity Losses (adjusted)				Cost per Capita	per Capita Rank	Cost per Smoker	per Smoker Rank
	Cancer	Heart	Lung	TOTAL				
Barbour	\$3,880,000	\$2,623,000	\$1,528,000	\$8,031,000	\$523	43	\$3,162	18
Berkeley	\$24,030,000	\$18,037,000	\$7,352,000	\$49,419,000	\$557	38	\$2,845	27
Boone	\$10,655,000	\$6,703,000	\$3,624,000	\$20,982,000	\$824	4	\$3,304	13
Braxton	\$5,224,000	\$2,344,000	\$1,951,000	\$9,519,000	\$648	20	\$3,032	21
Brooke	\$7,336,000	\$5,820,000	\$2,608,000	\$15,764,000	\$643	21	\$2,563	37
Cabell	\$25,977,000	\$22,941,000	\$11,921,000	\$60,839,000	\$641	22	\$3,403	6
Calhoun	\$2,965,000	\$1,063,000	\$567,000	\$4,595,000	\$637	24	\$2,332	46
Clay	\$3,103,000	\$2,096,000	\$1,335,000	\$6,534,000	\$635	25	\$2,429	40
Doddridge	\$2,364,000	\$2,708,000	\$441,000	\$5,513,000	\$758	6	\$3,725	2
Fayette	\$16,359,000	\$11,281,000	\$6,330,000	\$33,970,000	\$725	10	\$3,334	11
Gilmer	\$2,148,000	\$1,292,000	\$772,000	\$4,212,000	\$604	31	\$2,160	51
Grant	\$1,881,000	\$730,000	\$1,264,000	\$3,875,000	\$336	54	\$1,745	55
Greenbrier	\$8,268,000	\$7,109,000	\$4,040,000	\$19,417,000	\$562	37	\$2,778	29
Hampshire	\$4,900,000	\$3,068,000	\$2,140,000	\$10,108,000	\$475	47	\$2,681	33
Hancock	\$8,887,000	\$7,640,000	\$3,090,000	\$19,617,000	\$629	27	\$2,790	28
Hardy	\$2,401,000	\$1,795,000	\$623,000	\$4,819,000	\$365	53	\$2,317	48
Harrison	\$17,846,000	\$13,882,000	\$8,758,000	\$40,486,000	\$595	32	\$2,940	26
Jackson	\$8,588,000	\$4,817,000	\$2,906,000	\$16,311,000	\$578	35	\$2,987	23
Jefferson	\$10,833,000	\$8,400,000	\$3,604,000	\$22,837,000	\$485	46	\$2,406	42
Kanawha	\$58,373,000	\$45,796,000	\$20,245,000	\$124,414,000	\$639	23	\$3,159	19
Lewis	\$5,128,000	\$4,091,000	\$2,360,000	\$11,579,000	\$679	15	\$3,216	16
Lincoln	\$7,698,000	\$5,305,000	\$3,739,000	\$16,742,000	\$750	7	\$3,022	22
Logan	\$15,501,000	\$12,130,000	\$4,815,000	\$32,446,000	\$901	3	\$3,397	8
McDowell	\$12,968,000	\$9,347,000	\$4,381,000	\$26,696,000	\$1,097	1	\$3,808	1
Marion	\$13,690,000	\$11,778,000	\$4,633,000	\$30,101,000	\$535	42	\$2,622	34
Marshall	\$9,069,000	\$8,507,000	\$3,520,000	\$21,096,000	\$614	30	\$2,400	43
Mason	\$7,859,000	\$6,651,000	\$2,895,000	\$17,405,000	\$676	17	\$2,424	41
Mercer	\$17,996,000	\$15,139,000	\$8,712,000	\$41,847,000	\$679	15	\$3,154	20
Mineral	\$5,617,000	\$4,574,000	\$2,456,000	\$12,647,000	\$469	49	\$2,461	39
Mingo	\$10,172,000	\$10,198,000	\$5,977,000	\$26,347,000	\$977	2	\$3,213	17
Monongalia	\$12,626,000	\$9,543,000	\$3,508,000	\$25,677,000	\$301	55	\$1,956	54
Monroe	\$4,374,000	\$2,975,000	\$1,592,000	\$8,941,000	\$665	19	\$3,228	15
Morgan	\$6,379,000	\$2,631,000	\$1,410,000	\$10,420,000	\$666	18	\$3,631	3
Nicholas	\$6,607,000	\$3,995,000	\$3,724,000	\$14,326,000	\$551	39	\$2,595	36
Ohio	\$12,797,000	\$9,174,000	\$4,517,000	\$26,488,000	\$585	33	\$2,378	44
Pendleton	\$1,305,000	\$904,000	\$688,000	\$2,897,000	\$366	52	\$2,281	49
Pleasants	\$1,534,000	\$1,963,000	\$1,058,000	\$4,555,000	\$618	29	\$2,618	35
Pocahontas	\$2,821,000	\$1,358,000	\$999,000	\$5,178,000	\$579	34	\$3,547	4
Preston	\$7,563,000	\$5,789,000	\$2,827,000	\$16,179,000	\$546	40	\$2,761	30
Putnam	\$10,871,000	\$7,969,000	\$3,843,000	\$22,683,000	\$425	51	\$2,334	45
Raleigh	\$20,592,000	\$19,885,000	\$8,816,000	\$49,293,000	\$626	28	\$2,945	25
Randolph	\$5,614,000	\$4,775,000	\$2,944,000	\$13,333,000	\$471	48	\$2,256	50
Ritchie	\$2,944,000	\$2,700,000	\$1,606,000	\$7,250,000	\$706	12	\$3,372	9
Roane	\$5,309,000	\$3,088,000	\$2,695,000	\$11,092,000	\$725	10	\$2,692	32
Summers	\$3,988,000	\$2,840,000	\$2,435,000	\$9,263,000	\$680	14	\$3,320	12
Taylor	\$3,797,000	\$2,947,000	\$2,309,000	\$9,053,000	\$565	36	\$3,403	6
Tucker	\$2,862,000	\$1,457,000	\$520,000	\$4,839,000	\$686	13	\$3,360	10
Tyler	\$4,535,000	\$2,020,000	\$1,010,000	\$7,565,000	\$815	5	\$3,423	5
Upshur	\$5,045,000	\$3,522,000	\$2,501,000	\$11,068,000	\$469	49	\$2,320	47
Wayne	\$14,849,000	\$10,488,000	\$5,603,000	\$30,940,000	\$733	9	\$3,243	14
Webster	\$3,101,000	\$1,812,000	\$1,249,000	\$6,162,000	\$633	26	\$2,963	24
Wetzel	\$4,400,000	\$3,265,000	\$881,000	\$8,546,000	\$502	45	\$2,126	53
Wirt	\$1,636,000	\$513,000	\$873,000	\$3,022,000	\$523	43	\$2,747	31
Wood	\$19,841,000	\$19,037,000	\$7,777,000	\$46,655,000	\$537	41	\$2,555	38
Wyoming	\$7,481,000	\$7,739,000	\$2,939,000	\$18,159,000	\$750	7	\$2,144	52
WV Total	\$504,587,000	\$390,254,000	\$196,911,000	\$1,091,752,000	\$605		\$2,848	

SECTION 5:

Tax Issues That Relate to Tobacco Use in West Virginia

- West Virginia, at \$0.55 per pack, ranked 41st in FY2008 in state excise tax on cigarettes; the state's tax was much lower than the U. S. average of \$1.21 per pack.
- The state cigarette excise tax has not maintained its percentage of the total price of a pack of cigarettes.

West Virginia has assessed a cigarette excise tax on each pack of cigarettes since FY1948. The tax increased from \$0.07 to \$0.12 in FY1971 to \$0.17 in FY1979, and then to \$0.55 in FY2003 (see Figure 16). Over the past 25 years, the average price of a pack of cigarettes has increased dramatically. Currently, cigarette taxes account for only a small portion of the total cost per pack. In 2008, the cigarette excise tax represented 15.8% of the average price of a pack of cigarettes, compared with 31% in 1986 (15).

The Campaign for Tobacco-Free Kids (CTFK) calculated the FY2008 overall average state cigarette excise tax of \$1.21 per pack: major tobacco-growing states averaged \$0.385 per pack; other states averaged \$1.32 per pack. Quoting CTFK: "...44 states, D.C., and Puerto Rico have implemented or passed 84 cigarette tax rate increases since January 1, 2002, with 20 of those states passing more than one increase during that time period. [Only] 6 states...have not increased their tax since 1999 or before. As time passes, inflation erodes the real value of state tobacco tax rates and revenues, as they account for increasingly small portions of the total retail price of a pack of cigarettes." West Virginia ranked 41st among all 50 states and D. C. in its state excise tax on cigarettes (28).

The annual state cigarette excise tax revenue was about \$32 million in FY2002, and increased to \$103 million in FY2004 after the tax increase in May 2003 (from \$0.17 to \$0.55 per pack) (4). The cigarette tax revenue in FY2008 was \$109 million, and tax revenue from non-cigarette tobacco products was \$5.5 million. Note: The tobacco industry spends about \$132 million each year to market its products in West Virginia (26).

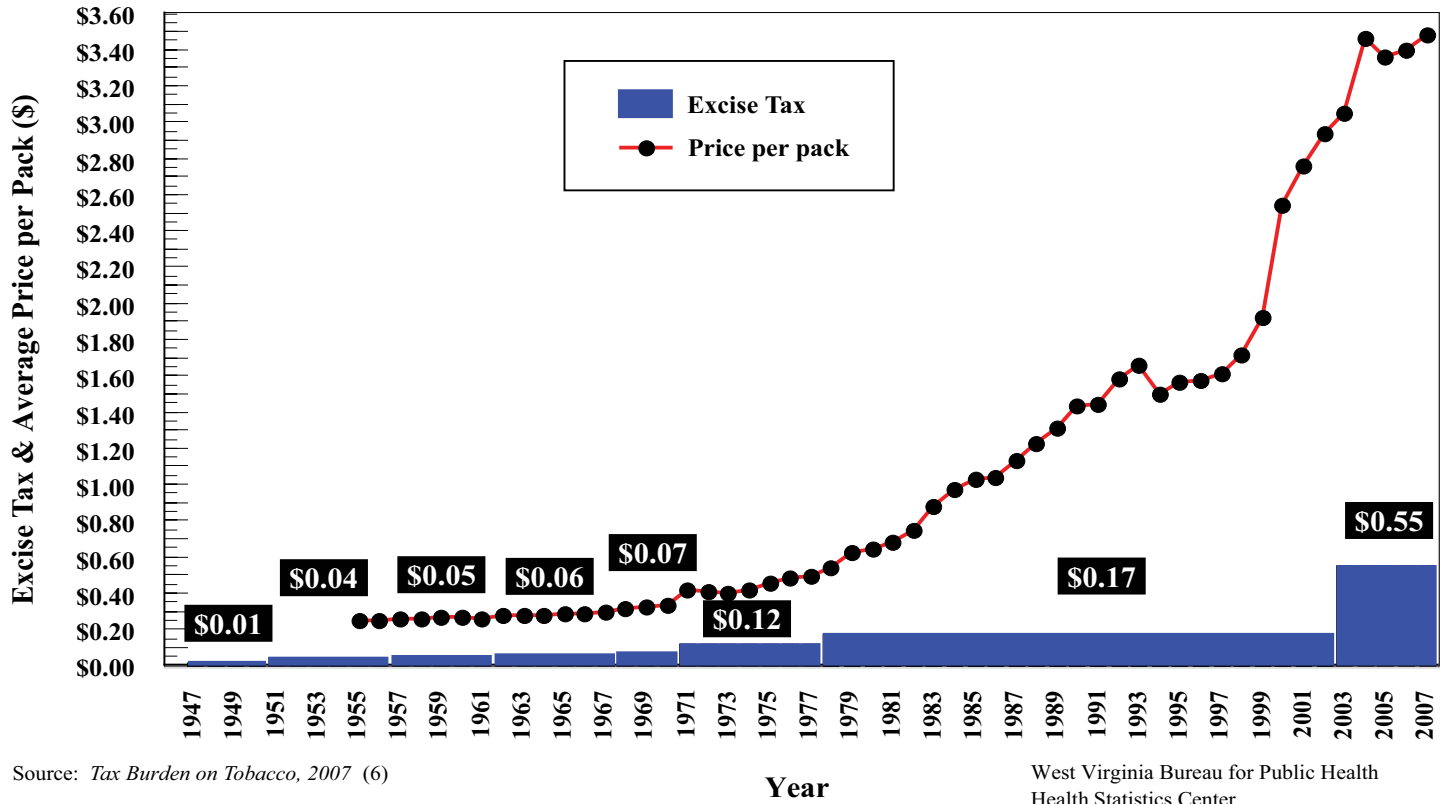
According to price elasticity theories, increases in product prices will decrease consumer purchases of that product to some extent. According to the National Cancer Policy Board, Institute of Medicine and National Research Council, "The single most direct and reliable method for reducing consumption is to increase the price of tobacco products, thus encouraging the cessation and reducing the level of initiation of tobacco use" (29). Youth are more impacted by price increases because they have less expendable income (30). According to CTFK, state cigarette excise tax increases across the U. S. have increased revenue and decreased cigarette consumption, often resulting in declines in prevalence (31).

Effective April 1, 2009, the federal government excise tax on cigarettes (and little cigars) increased from \$0.39 to \$1.01 per pack (a \$0.62 increase) (32). This will increase the price of the product, raising revenue for the U. S., and will likely decrease cigarette consumption.

Non-cigarette tobacco products (all forms of smokeless tobacco, cigars, pipes, roll-your-own, etc.) were not taxed in West Virginia prior to January 2002. The tax on these products is assessed at 7% of the wholesale cost of the product (4). Since these products are so varied in packaging and wholesale cost, the WV Department of Tax and Revenue does not require wholesalers to report on quantities sold.

Figure 16:

West Virginia Cigarette Excise Tax Increases Compared with the Price of Cigarettes (per pack) Since 1947



Source: *Tax Burden on Tobacco, 2007* (6)

West Virginia Bureau for Public Health
Health Statistics Center

CONCLUSION

The Problem

Despite the fact that the consequences of tobacco use are well known to West Virginians, the state's residents continue to smoke cigarettes and use smokeless tobacco in alarming numbers. Tobacco use remains the number one preventable cause of premature death and disease in West Virginia and the United States.

This report provides estimates for the period 2002 through 2006 concerning the impact of cigarette smoking among adults in West Virginia:

- Each year 3,785 adults die prematurely from smoking.
- Each year nearly 55,000 years of potential life are lost due to these premature deaths.
- In 2006 alone, the direct health care costs due to smoking amounted to \$1.3 billion (or \$718 per capita).
- Each year West Virginia loses about \$1.09 billion in smoking-attributable productivity losses (or \$605 per capita).
- Each year the total of all economic costs for smoking in West Virginia is over \$2.4 billion.
- Smoking accounts for 19% of all deaths in West Virginia.
- Smoking accounts for 47% of all the Years of Potential Life Lost in West Virginia.
- Tobacco use rates among West Virginia adults and youth are among the highest in the United States.
- If tobacco use rates do not significantly decrease and health care costs continue to rise, the economic costs associated with tobacco use will likewise continue to escalate.

The Challenge

This question is before us: Is West Virginia committed to decreasing the impact of tobacco use among its citizens? Prevention and cessation programs cost money. The CDC recommends that West Virginia spend \$28 million annually for these programs. Currently the annual funding is about \$7 million. By comparison, the tobacco industry spends about \$132 million each year to market its products in West Virginia. At present funding levels for prevention and control programs, West Virginia is still experiencing high rates of tobacco use among adults and youth, and cannot fully implement the comprehensive program that is supported by research and advocated by the CDC.

The Resources

The Division of Tobacco Prevention state and local efforts, modeled after the CDC's National Public Health Performance Standards, include the following:

1. Monitor health status of adult and youth tobacco users, and those affected by tobacco use, such as those individuals exposed to secondhand smoke, to identify health problems;
2. Diagnose and investigate health problems and hazards associated with tobacco use;
3. Inform, educate, and empower youth and adults about tobacco's health-related issues;
4. Mobilize partnerships and local coalitions to identify and solve health problems related to tobacco use;
5. Develop and sustain policies and plans that support individual health efforts, such as county clean indoor air regulations and workplace support of smoking cessation programs.
6. Assist with programs to enforce laws and regulations that protect health and ensure safety;
7. Link West Virginia residents to needed personal health services and assure the provision of health care when otherwise unavailable, such as assuring access to West Virginia Tobacco Cessation Quitline services for citizens who are uninsured;
8. Assure a competent public and personal health care workforce;
9. Evaluate the effectiveness, accessibility, and quality of personal and population-based health services and tobacco prevention interventions; and
10. Research and advocate for new insights and innovative solutions to health problems caused by tobacco use.

The Solution

The state's Division of Tobacco Prevention and its partners maintain interventions and services that employ much of the Center for Disease Control and Prevention's (CDC) "10 Essential Public Health Services" and "Best Practices for a Comprehensive Tobacco Prevention Program." The following strategies are based on recommendations for effective tobacco use prevention by the CDC, and are implemented to the extent possible by the State of West Virginia to reduce the burden of tobacco use in the state:

- Increase the state excise tax on cigarettes and all other forms of tobacco to meet or exceed the national average of \$1.21 per pack (as of April 2009).
- Advocate for state funding for tobacco use prevention and control efforts at annual levels as recommended by the CDC's *Best Practices* (\$28 million for West Virginia).
- Ensure that all West Virginia residents have full access to West Virginia Tobacco Cessation Quitline services, including free pharmaceuticals for cessation.
- Work with schools and communities to prevent youth tobacco use, promote youth empowerment efforts such as the West Virginia RAZE® program, and support youth tobacco cessation efforts.
- Reduce public exposure to secondhand smoke by eliminating smoking in all public areas, and in all workplaces.
- Support state and county school systems in providing proven effective tobacco prevention curricula and cessation services to youth.
- Advocate for policies that promote and support tobacco use prevention efforts, such as tobacco advertising restriction policies and enforcement strategies for preventing illegal tobacco sales to minors.

Smoking and other tobacco use continues to be the single most preventable cause of unnecessary health care costs in West Virginia, costing the state's economy almost \$2.5 billion per year. West Virginia can decrease these unnecessary health care expenses by increasing tobacco product excise taxes; using tobacco tax revenue to enhance and support effective, sustained, and comprehensive tobacco prevention and cessation programs; working toward prohibiting smoking in all public and work places; and encouraging health insurance companies to provide for tobacco cessation services.

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Appendix A: Reference Population Table A2

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APPENDIX A: Table A1
 Estimated Annual Smoking-Attributable Mortality (SAM)
 Rate of Death by SAM and Years of Potential Life Lost (YPLL) by SAM
 For Adults Age 35+ by State (SAMMEC 2000-2004) (18)

State	SAM Deaths	SAM Death		YPLL Years by SAM
		Rate per 100,000	Rate Rank	
Alabama	7,585	317.5	8	109,026
Alaska	492	270.4	23	7,762
Arizona	6,859	247.4	37	87,777
Arkansas	4,915	323.7	7	69,308
California	36,687	235.0	46	481,529
Colorado	4,390	237.6	43	54,905
Connecticut	4,785	238.3	42	62,697
Delaware	1,198	280.9	19	16,398
District of Columbia	722	249.9	33	11,622
Florida	28,609	258.8	32	382,399
Georgia	10,547	299.4	12	162,274
Hawaii	1,160	167.6	50	16,080
Idaho	1,511	237.4	44	20,466
Illinois	16,601	263.1	27	229,623
Indiana	9,731	308.9	9	138,915
Iowa	4,444	248.0	35	57,017
Kansas	3,884	262.7	28	50,541
Kentucky	7,848	370.6	1	112,760
Louisiana	6,500	299.8	11	95,770
Maine	2,235	289.8	16	30,017
Maryland	6,861	261.9	29	96,092
Massachusetts	9,016	249.4	34	119,905
Michigan	14,523	281.9	18	209,147
Minnesota	5,534	215.1	49	69,377
Mississippi	4,757	333.6	4	70,677
Missouri	9,585	307.8	10	136,327
Montana	1,421	276.0	20	17,071
Nebraska	2,272	235.8	45	28,341
Nevada	3,311	343.7	3	45,524
New Hampshire	1,763	272.4	22	24,022
New Jersey	11,203	239.5	40	153,557
New Mexico	2,106	234.0	47	27,286
New York	25,433	246.1	38	344,110
North Carolina	12,265	298.4	14	181,566
North Dakota	875	225.6	48	11,133
Ohio	18,593	299.1	13	264,309
Oklahoma	6,209	332.1	5	85,208
Oregon	4,979	263.3	26	64,492
Pennsylvania	20,027	259.0	31	272,335
Rhode Island	1,695	266.8	25	21,753
South Carolina	6,127	293.4	15	93,701
South Dakota	1,068	239.2	41	13,158
Tennessee	9,712	325.0	6	142,301
Texas	24,571	273.1	21	350,409
Utah	1,155	138.3	51	15,071
Vermont	831	247.5	36	11,432
Virginia	9,242	267.0	24	132,157
Washington	7,619	261.0	30	104,061
West Virginia	3,821	344.3	2	56,156
Wisconsin	7,243	244.2	39	97,456
Wyoming	702	283.1	17	8,806
Median	5,534	263.3		70,677
U. S. Total	443,000			5,100,000

West Virginia Bureau for Public Health, Health Statistics Center

APPENDIX A: Table A2

Reference Populations for West Virginia Used in Calculations for This Report

County	2004 Total Population	2004 Adults 35+	2006 Total Population	2002-2006 Number of Adult Smokers
Barbour	15,341	8,482	15,475	2,540
Berkeley	88,673	45,613	96,847	17,370
Boone	25,478	14,027	25,156	6,350
Braxton	14,700	8,338	14,606	3,140
Brooke	24,525	14,405	23,911	6,150
Cabell	94,911	50,555	94,406	17,880
Calhoun	7,215	4,273	7,247	1,970
Clay	10,295	5,428	10,063	2,690
Doddridge	7,273	4,043	7,228	1,480
Fayette	46,835	26,364	46,358	10,190
Gilmer	6,979	3,658	6,906	1,950
Grant	11,516	6,482	11,779	2,220
Greenbrier	34,576	20,557	34,566	6,990
Hampshire	21,291	11,775	22,250	3,770
Hancock	31,175	18,730	30,623	7,030
Hardy	13,206	7,408	13,490	2,080
Harrison	68,008	38,199	68,384	13,770
Jackson	28,235	15,706	28,151	5,460
Jefferson	47,057	24,986	49,712	9,490
Kanawha	194,662	112,141	191,876	39,380
Lewis	17,065	9,809	17,123	3,600
Lincoln	22,317	11,930	22,331	5,540
Logan	36,028	20,046	35,724	9,550
McDowell	24,343	14,002	23,391	7,010
Marion	56,242	31,650	56,511	11,480
Marshall	34,360	19,857	33,499	8,790
Mason	25,730	14,633	25,548	7,180
Mercer	61,668	34,949	61,118	13,270
Mineral	26,978	14,958	26,705	5,140
Mingo	26,971	14,364	26,685	8,200
Monongalia	85,410	37,673	86,839	13,130
Monroe	13,455	7,724	13,467	2,770
Morgan	15,652	9,217	16,178	2,870
Nicholas	26,023	14,661	26,190	5,520
Ohio	45,286	26,019	44,645	11,140
Pendleton	7,916	4,650	7,762	1,270
Pleasants	7,367	4,109	7,229	1,740
Pocahontas	8,940	5,389	8,700	1,460
Preston	29,608	16,578	30,131	5,860
Putnam	53,374	28,971	54,422	9,720
Raleigh	78,690	44,115	78,708	16,740
Randolph	28,315	15,812	28,345	5,910
Ritchie	10,275	5,889	10,396	2,150
Roane	15,296	8,596	15,425	4,120
Summers	13,627	8,368	13,339	2,790
Taylor	16,015	9,005	16,114	2,660
Tucker	7,052	4,264	6,896	1,440
Tyler	9,281	5,416	9,108	2,210
Upshur	23,623	12,585	23,472	4,770
Wayne	42,208	23,092	41,509	9,540
Webster	9,741	5,576	9,569	2,080
Wetzel	17,014	9,845	16,641	4,020
Wirt	5,775	3,169	5,786	1,100
Wood	86,812	49,041	86,255	18,260
Wyoming	24,210	13,795	23,904	8,470
WV Total	1,804,618	1,000,927	1,808,699	383,400

Table 3 uses 2004 Adults Age 35+ population to calculate SAM Death Rate.

Table 4 uses 2004 Adults Age 35+ population to calculate SAYPLL Rate.

Table 5 uses 2004 Total Population to calculate costs per Capita, and 2002-2006 Adult Smokers Age 18+ to calculate costs per smoker.

Table 5 uses 2006 Total Population to calculate costs per Capita, and uses 2002-2006 Adult Smokers Age 18+ to calculate costs per smoker.

Population estimates are from the U. S. Census Bureau (33)

West Virginia Bureau for Public Health Health Statistics Center

APPENDIX B: Methodology

Accuracy and Estimates

BRFSS data is based on representative sampling of the general adult population, which yields our best estimate of tobacco-use prevalence for adults. SAMMEC formulas use multiple files of data, which, again, are often estimates, creating more estimates with varying degrees of accuracy.

The WV Health Statistics Center (HSC) prides itself on producing credible and reliable data and reports. Much research has been done to seek out the best models using the best protocols. The HSC feels that this report provides the best estimates on data that can be obtained for the state of West Virginia. Discrepancies caused by rounding or weighting and computation errors may explain why a prevalence value multiplied by population will result in different numbers than those presented here. Please do not hesitate to contact the HSC for more information or to discuss the contents of this report.

The HSC produces reliable data by requiring the following: “n” (frequency) greater than 50; a Confidence Interval range of less than 20 (with 95% confidence); and a Relative Standard Error of less than 30.

SAMMEC

The HSC used the updated CDC computer program “Smoking-Attributable Mortality, Morbidity, and Economic Costs” (SAMMEC 2004) (16). This software program uses seven files to calculate a variety of death and cost estimates related to smoking. SAMMEC can be used to calculate state and county mortality and financial burdens caused by smoking-related cancers, heart diseases, and lung diseases. The SAMMEC methodology has been revised over time; however, the models have produced consistent results and have proven to be a reliable method for estimating smoking-related mortality. The SAMMEC model, at present, cannot be used to estimate deaths from other tobacco products, secondhand smoke exposure, infant deaths due to maternal smoking, or fire deaths associated with tobacco use.

By combining five years of data, and grouping counties into regions, the HSC is able to provide estimates at the county level. Data for the five years 2002-2006 were the most recent available for this report due to the fact that the HSC had not yet received out-of-state death records for West Virginia residents for later years from many of the neighboring states at the time of analysis. Death data are necessary to calculate county and state level SAM and SAPL.

For SAM (Table 3, Figure 7, and Figure 8) and SAPL (Table 4, Figure 9), the individual county deaths and productivity losses have been rounded. In addition to the rounding, other factors may have affected the breakdown of county data from state data (weighting, computation errors, etc.). This explains why the counties’ SAMs will not add up to equal the state SAM, and the same is true for SAPL. The SAMMEC software provides better estimates for larger populations than for smaller ones. When reporting annual SAM and annual SAPL for general purposes, please use the *WV Total* values.

Although SAMMEC does provide calculations for maternal and child health mortality or economic costs, the HSC feels that other methods of analysis will yield more accurate estimates for the health risk of maternal smoking.

Smoking-Attributable Mortality (SAM)

SAMMEC calculates Smoking-Attributable Mortality (or Deaths) based on the smoking-attributable fractions formula developed by Lillienfeld and Lillienfeld (1980). SAM uses national files for Relative Risk [CPS (II (82-88))], and state-specific files for smoking prevalence (from BRFSS 2002-2006) by gender, age (35-64 and 65+), and smoking status (current and former); number of deaths (19 causes of death by ICD-10 codes) by gender, and by five-year age groupings 35-85+, from WV Vital Statistics 2002-2006; and population, using 2004 as mid-point. To increase the reliability of the data, counties were grouped into eight public health regions, with regional weighting, to compute the smoking prevalences. SAMMEC estimates deaths of adult cigarette smokers age 35+ (see Section 3: Table 3). This does not include other smoked tobacco products, secondhand smoke exposure, infant deaths due to maternal smoking, smokeless tobacco, nor does it include fire-related deaths (16).

Smoking-Attributable Years of Potential Life Lost (SAYPLL)

SAMMEC also calculates Smoking-Attributable Years of Potential Life Lost (SAYPLL) by applying the number of deaths (mortality) from SAM, and then multiplying this by the remaining life expectancy, obtained from the U. S. 2004 life expectancy calculations. All data were based on adults age 35+. SAYPLL calculates how many years have been lost from the lives of smokers/former smokers who have died prematurely from smoking-caused diseases (see Section 3: Table 4). Although true YPLL is calculated for adults dying earlier than age 75, SAMMEC calculates YPLL for adults up to age 85+. This does not include other smoked tobacco products, secondhand smoke exposure, infant deaths due to maternal smoking, smokeless tobacco, smoking-related morbidity (not resulting in death), nor does it include fire-related deaths (16) .

Direct Health Care Costs

Data on the health care costs of smoking were calculated using two different economic models developed by Vincent Miller et al. (Model 1) (20) and Leonard Miller et al. (Model 2) (21) . At the core of both models is the concept of the Smoking-Attributable Fraction (SAF), which is the proportion of the average medical care expenditure for a specific category (physician and clinical services, other professional services, hospital care, drugs, and other medical nondurables, nursing home care, home health care, and other personal health care) due to cigarette smoking. Simply stated, an SAF expresses the ratio of the cost difference between current and former smokers and never-smokers. The HSC elected to show the results of both models after consultation with Dr. Jeffery Fellows of the CDC. The SAFs from both models were applied to estimated health care expenditures for West Virginia obtained from the federal Health Care Financing Administration (HCFA) (22). HCFA provided updated data for West Virginia through 2004, and Consumer Price Index inflation rates for “medical care services” for applicable years were applied to 2004 data to estimate 2005 and 2006 costs (see Section 4: Figure 10, Table 5) (23). These estimates of direct health care costs do not include other smoked tobacco products, secondhand smoke exposure, infant deaths due to maternal smoking, smokeless tobacco, nor do they include fire-related deaths.

HCFA updated its older tables; this explains why the estimates presented in this report will not match the estimates from the 2005 *Tobacco Is Killing and Costing Us*, even holding constant the two models used in both reports.

Smoking-Attributable Productivity Losses (SAPL)

Smoking-Attributable Productivity Losses were calculated in SAMMEC using national Present Value of Future Earnings (U. S. 2004 PVFE from Haddix et al., 2003), Relative Risk (CPS II [82-88]), Life Expectancy (U. S. 2004 Life Expectancy), U. S. 2000 Standard Population, and state-specific files for smoking prevalence, number of deaths, and selected population. SAPL is defined as the present value of foregone future earnings from paid labor and of foregone future imputed earnings from unpaid household work due to premature death from smoking-related diseases. These are costs that could be avoided if cigarette smoking were eliminated from the population. SAPL estimates productivity losses resulting from deaths of adult cigarette smokers age 35+. This does not include other smoked tobacco products, secondhand smoke exposure, infant deaths due to maternal smoking, smokeless tobacco, smoking-related morbidity (not resulting in death), nor does it include fire-related deaths (16) .

These costs were adjusted for inflation (after consultation with the Office on Smoking and Health [OSH] at CDC) by using the Employment Cost Index (ECI) from the Bureau for Labor Statistics (“total compensation for civilian workers”) (34). The base year of 2002 for this report was compared with the ECI indexes for 2002 through 2006. The resulting growth factor of 2.36% was applied to all SAPL values calculated by SAMMEC, resulting in a SAPL for 2006 of \$1.092 billion (see Section 4: Table 6).

BRFSS and County-Level Groupings and Data

Approximately 3,600 adults are interviewed each year in West Virginia as part of the Behavioral Risk Factor Surveillance System (BRFSS). Counties with larger populations are more likely to be represented in these interviews than counties with small populations. Therefore, in order to have large enough sample sizes to produce

reliable county estimates of adult tobacco use prevalence, multiple years of BRFSS data must be combined and some counties must be grouped with neighboring counties for analysis. The BRFSS data are weighted each year to be representative of the West Virginia adult age and sex population distribution for that year. To produce accurate county estimates, the multi-year data file is reweighted to be representative of the 2000 census age and sex population distribution of each county or county region.

BRFSS is a telephone “landline” survey conducted monthly, interviewing adults 18+ who are West Virginia residents. It contains 120-140 questions. Trained interviewers ask the questions and completion time is about 20 minutes. “Self-reported” information is obtained on a variety of risk behaviors affecting health/medical care, psycho-social health, safety, etc. West Virginia has participated in this CDC-sponsored survey since 1984.

The HSC uses the software program SAS to analyze the BRFSS data, often cross-tabulating questions to provide richer information that is used by many programs in the Bureau for Public Health. This health resource is a driving force in program planning and evaluation.

County prevalence rates for smoking (Figure 1, Figure 2, and Table 1) were calculated using BRFSS data for the five years 2002 through 2006, and male smokeless tobacco use data (Figure 3, Figure 4, and Table 2) were obtained from BRFSS for 2000 through 2004, the most recent data available for that question. The five-year aggregated sample sizes were large enough for 24 of the 55 counties to stand alone, that is, to yield individual county prevalence calculations. The remaining 31 counties, which had sample sizes too small to stand alone, were combined into 12 groupings of counties. The aim was to arrive at as many groups of contiguous counties as possible, provided that the group’s sample sizes were sufficiently large for statistical analysis. Similarity in poverty level was an additional factor in deciding which counties to group together. For each county, the smoking prevalence for its grouping or region was used as the best estimate of its own value. The 12 groups of counties plus the 24 stand-alone counties resulted in 36 geographical entities:

Stand-Alone Counties:		County Groupings:
Berkeley	Mason	Boone, Lincoln
Brooke	Mercer	Greenbrier, Monroe, Summers
Cabell	Mingo	Braxton, Nicholas, Webster
Fayette	Monongalia	Hardy, Pendleton, Pocahontas
Hancock	Ohio	Calhoun, Clay, Gilmer, Roane
Harrison	Putnam	Jackson, Wirt
Jefferson	Raleigh	Doddridge, Lewis, Ritchie
Kanawha	Randolph	Pleasants, Tyler, Wetzel
Logan	Upshur	Barbour, Taylor
McDowell	Wayne	Preston, Tucker
Marion	Wood	Grant, Mineral
Marshall	Wyoming	Hampshire, Morgan

Counties were grouped into eight public health regions to calculate smoking prevalence for SAM and SAPL. Regional weights were also calculated specific to these regions.

Eight Public Health Regions:
Northern Panhandle: Brooke, Hancock, Marshall, Ohio, Wetzel
North Central: Barbour, Doddridge, Gilmer, Harrison, Lewis, Marion, Monongalia, Preston, Randolph, Taylor, Tucker, Upshur
Eastern Panhandle: Berkeley, Grant, Hampshire, Hardy, Jefferson, Mineral, Morgan, Pendleton
Greenbrier Valley: Braxton, Fayette, Greenbrier, Nicholas, Pocahontas, Webster
Southern Coalfield: McDowell, Mercer, Monroe, Raleigh, Summers, Wyoming
Western: Cabell, Lincoln, Logan, Mason, Mingo, Wayne
Kanawha Valley: Boone, Clay, Kanawha, Putnam
Mid-Ohio Valley: Calhoun, Jackson, Pleasants, Ritchie, Roane, Tyler, Wirt, Wood

Racial Disparities

West Virginia's population of racial minorities is very small, accounting for 5% or less among adults (35). African Americans are the largest racial minority (3.2%), followed by Asian/Pacific Islanders (0.5%) and persons who described themselves as multi-racial (0.9%). The most recent smoking prevalence estimated for African American adults is 18.3% (2004-2008 BRFSS), significantly less than the prevalence for all adult West Virginians (26.9%, BRFSS 2007). Due to limitations in SAMMEC with sample sizes, the HSC did not attempt to estimate the burden of smoking by race.

Definitions for BRFSS

“Adult” is any West Virginia resident age 18 years or older (18+).

“High School” includes West Virginia residents in public high school grades 9-12, and includes students age 14 to 19 (with some exceptions). The majority of students are age 15-17 (about 14% were 18+ in 2007).

“Current Smoker”:

Adult: Smoked 100+ cigarettes in lifetime, and now smokes every day or some days.

High School: Smoked a cigarette on 1 or more days in past 30 days.

“Current Smokeless Tobacco User”:

Adult: Used smokeless tobacco in the past, and now uses smokeless tobacco every day or some days. The prevalence of smokeless tobacco use among adult women in West Virginia was 0.4% in 2004, which is relatively low; therefore, West Virginia reports smokeless tobacco use only among adult men.

High School: Used smokeless tobacco on 1 or more days in past 30 days. The prevalence of smokeless tobacco use among high school females in West Virginia was 3.1% in 2007, which is relatively low; therefore, West Virginia reports smokeless tobacco use only among high school males.

“Rank”:

Counties are ranked in order of severity of the problem. For data where groupings were not used (such as SAM and SAPL), the counties are ranked from #1 to #55, #1 being the worst case. For data where counties were grouped (smoking prevalence, smokeless tobacco use prevalence), counties in the same group or region will share the same rank number, ranging from #1 to #36 (skipping). Ranking has been done after rounding.

Definitions for SAMMEC (16)

In SAM, deaths by disease are presented as “malignant neoplasms,” “cardiovascular diseases,” and “respiratory diseases”; however, for brevity this report uses the terms cancer, heart diseases, and lung diseases (non-cancer-related).

Interpreting Figures and Tables

Figure 1: Current Cigarette Smoking in West Virginia. The adult (18+) current smoking data are from the annual BRFSS. The high school data are from the Youth Tobacco Survey (YTS), which was administered in 2000, 2002, 2005, and 2007. The high school students' ages range from 14 through 19 years old.

Figure 2: Adult Current Cigarette Smoking Map. Counties are grouped in four prevalence ranges. Data from Table 1 are the basis for this map.

Figure 3: Male Current Smokeless Tobacco Use, West Virginia. The adult (18+) current smokeless tobacco use among males data are from the annual BRFSS. This question was last asked in 2004. The high school male smokeless tobacco use data are from YTS, administered in 2000, 2002, 2005, and 2007.

Figure 4: Adult Male Current Smokeless Tobacco Use Map. Counties are grouped in four prevalence ranges. Data from Table 2 are the basis for this map.

Figure 5: West Virginia Cigarette Sales. This graph depicts fiscal year (July 1-June 30) sales of cigarettes, rounded to the nearest “millions of packs,” from data provided by the WV Department of Tax and Revenue.

Figure 6: Annual per Capita Cigarette Sales. This graph uses the per capita sales data (total cigarette pack sales divided by the population) provided by the annual publication *Tax Burden on Tobacco*, which provides this measure for each state and the U. S. average.

Figure 7: Percent of Total Annual Deaths Attributable to Smoking by County Map. Counties are grouped

in four ranges. Data from Table 3 are the basis for this map.

Figure 8: Comparing 2002-2006 Smoking-Attributable Rate of Death with 2006 Leading Causes of Death in West Virginia. The SAM death rate calculated from Table 3 (378.1 per 100,000) is depicted in red because it cannot be considered as a separate cause of death. It comprises death data from cancer, heart diseases, and lung diseases (for calculations through SAMMEC). To a lesser extent, smoking also contributes to deaths from cerebrovascular diseases, diabetes, influenza/pneumonia, and several other diseases. The leading causes of death were obtained from *WV Vital Statistics, 2006*, and apply to adults age 35-74.

Figure 9: Smoking-Attributable Years of Potential Life Lost (YPLL). This pie chart illustrates the huge portion of YPLL resulting from smoking (with YPLL breakdown from cancer, heart diseases, and lung diseases), compared with total YPLL for West Virginia, obtained from *WV Vital Statistics, 2006*. Data from Table 4 are the basis for this figure.

Figure 10: Smoking-Attributable Direct Health Care Costs, West Virginia, 1998-2006. This trend graph illustrates Model 1 (V Miller et al.) compared with Model 2 (L Miller et al.). The federal Health Care Financing Administration has updated its files in retrospect, so that values based on HCFA data used in the previous *Tobacco Is Killing (and Costing) Us* (1998-2003) will not match the values in this report. Additionally, HCFA redistributed direct health care categories, so slight differences have resulted from the application of the smoking-attributable fractions to these new categories. Data from Table 5 are the basis for this figure.

Figure 11: Annual per Capita Smoking-Attributable Direct Health Care Costs by County, 2006, Map. Counties are grouped in 4 ranges. Data from Table 5 are the basis for this map.

Figure 12: Annual per Capita Smoking-Attributable Productivity Losses, by County, 2006, Map. Counties are grouped in four ranges. Due to the ECI inflation applied to the SAPL costs, only 2006 costs are represented in this map. Data from Table 6 are the basis for this map.

Figure 13: Average Annual Smoking-Attributable Productivity Losses per Adult Smoker, by County, 2006, Map. Counties are grouped in four ranges. Due to the ECI inflation applied to the SAPL costs, only 2006 costs are represented in this map. Data from Table 6 are the basis for this map.

Figure 14: Total Annual Smoking-Attributable Economic Costs in West Virginia, 2006. This bar chart combines the direct health care costs and productivity losses for total costs, using Model 1 and Model 2. Data from Table 5 and Table 6 are the basis for this figure.

Figure 15: Total Annual Smoking-Attributable Economic Costs per Adult Smoker and per Capita in West Virginia, 2006. This bar chart provides the total for direct health care costs and productivity losses, but depicts total costs per adult smoker and per capita. Data from Table 5 and Table 6 are the basis for this figure.

Figure 16: West Virginia Cigarette Excise Tax Increases since 1947. This graph depicts the (line) average price of a pack of cigarettes (from *Tax Burden on Tobacco*) compared with the (bars) West Virginia state excise tax.

Note: Map figures (Figures 2, 4, 7, 11, 12, and 13): County data for the respective issue were sorted by increasing value. The values were divided at the “WV average” (mean) into top half and bottom half, and then each of these was divided further into two more ranges with equal numbers of counties in each range.

Table 1: Adult Current Cigarette Smoking by County, 2002-2006. Sample sizes in some counties were large enough for individual analysis, while other counties were grouped to provide a large enough sample. The percentage or prevalence is the estimate of adult smokers in that county. The analysis program weights the respondents who participate in the BRFSS survey, to provide a representative snapshot of adults in that county based on age and gender. The “number of smokers” in that county is the weighted frequency of the smokers in that county. Also see BRFSS Definitions and Ranking.

Table 2: Adult Male Current Smokeless Tobacco Use by County, 2002-2006. The analysis program separates BRFSS respondents by gender and then weights the respondents based on age distribution for that county or group of counties. The “number of smokeless tobacco users” is the weighted frequency of the users in that county. Also see BRFSS Definitions and Ranking.

Table 3: Average Annual Smoking-Attributable Deaths (SAM). Data were entered into SAMMEC for each county (deaths and population) and smoking prevalence for that county’s region was entered. This resulted

in county-specific SAM deaths, distributed across cancer, heart diseases, and lung diseases, plus a total SAM for that county. Since SAMMEC provides more accurate estimates for larger populations, the data for the state of West Virginia were also entered. This West Virginia total of cancer, heart diseases, and lung diseases SAM deaths and total SAM deaths differed slightly from the sum of all the county data. A multiplier was used to apportion the difference across all counties, so that the sum of the county data would equal the West Virginia totals. “All deaths for adults 35+” was obtained from West Virginia vital statistics for that county (actual counts of deaths). The total SAM was divided by all deaths, to reveal the percentage of all deaths that are smoking attributable. The ranking was based on that percentage. The SAM rate of death was calculated from the county total SAM divided by the adult population +35 in that county, then multiplied by 100,000 (death rates are expressed per 100,000 of the population). Ranking was then done for the SAM rate of death. All data in Table 3 apply to adults age 35+. See also Ranking, Rounding, and BRFSS and County-Level Groupings.

Table 4: Average Annual Smoking-Attributable Years of Potential Life Lost (SAYPLL). Data were entered into SAMMEC for each county (deaths and population) and smoking prevalence for that county’s region was entered (16). This resulted in county-specific SAYPLL, distributed across cancer, heart diseases, and lung diseases, plus a total SAYPLL for that county. Since SAMMEC provides more accurate estimates for larger populations, the data for the state of West Virginia were also entered. This West Virginia total of cancer, heart diseases, and lung diseases SAYPLL and total SAYPLL differed slightly from the sum of all the county data. A multiplier was used to apportion the difference across all counties, so that the sum of the county data would equal the West Virginia totals. “All YPLL for 2002-2006 (averaged) for adults 35+” was obtained from WV vital statistics for that county. The county total SAYPLL was divided by all YPLL for that county to reveal the percentage of all YPLL that is smoking attributable. The ranking was based on that percentage. The SAYPLL rate was calculated from the county total SAYPLL divided by the adult population 35+ in that county, then multiplied by 100,000. Ranking was then done for the SAYPLL. All data in this table apply to adults age 35+. For comparability with other rate calculations in this report, the population of 35+ was used (and not 35-74). See also Ranking, Rounding.

Table 5: Direct Health Care Costs of Smoking-Attributable Deaths/Diseases. The smoking-attributable direct health care costs for West Virginia (see Section 4) were calculated using the work of two noted researchers. Vincent Miller (20) and Leonard Miller (21) (not related) independently developed two models for estimating health care costs related to cigarette smoking. These models are based on smoking-attributable fractions (SAFs), which are the proportion of the average medical care expenditures for a specific category (e.g., hospital care, ambulatory care, or prescription drugs) that is due to cigarette smoking. SAFs were applied to West Virginia health care expenditures (22), and medical services inflation rates were applied to estimate smoking-attributable direct health care costs (23). In this report, Model 1 refers to Vincent Miller et al., and Model 2 refers to Leonard Miller et al. Due to various components in the calculations, it is reported to the nearest million dollars.

To calculate each county’s share of the economic costs, the total number of smokers 18+ for that county was divided by total number of smokers 18+ for West Virginia. This “percentage” was applied to the economic costs for Model 1 and Model 2. The county’s economic costs were then divided by the county population, resulting in the per capita costs (costs shared among every man, woman, and child in that county). The year 2004 was chosen for the population since it is the midpoint of the data used in this report (2002-2006). A “per smoker” cost was also calculated using the estimated 2006 population of adult smokers 18+ in that county. Rankings were done only for Model 2 for the county per capita and per adult smoker costs. See also Ranking, Rounding.

Table 6: Average Annual Smoking-Attributable Productivity Losses (SAPL). Data were entered into SAMMEC for each county (deaths and population) and smoking prevalence for that county’s region was entered. This resulted in county-specific SAPL, distributed across cancer, heart diseases, and lung diseases, plus a total SAPL for that county. Since SAMMEC provides more accurate estimates for larger populations, the data for the state of West Virginia were also entered. This West Virginia total of cancer, heart diseases, and lung diseases SAPL and total SAPL differed slightly from the sum of all the county data. A multiplier was used to apportion the difference across all counties, so that the sum of the county data would equal the West Virginia totals. The county’s total SAPL was then divided by the county population. The year 2004 was chosen for the population since it is the midpoint of the data used in this report (2002-2006). The result is the per capita SAPL costs (costs

shared among every man, woman, and child in that county). A “per smoker” SAPL was also calculated using the estimated population of adult smokers 18+ in that county. The rankings were done for the SAPL per capita and per smoker. All data in this table apply to adults age 35+, except for the per smoker SAPL (to provide consistency with Table 5). See also Ranking, Rounding.

Table A1 (Appendix A): Estimated Annual Smoking-Attributable Mortality (SAM), Rate of Death by SAM, Years of Potential Life Lost by SAM. This table was created from the January 23, 2009, MMWR report, presenting SAM, SAM rate of death, and SAYPLL for all 50 states plus D. C. for the years 2000-2004. It is included here for comparison purposes only, to illustrate West Virginia’s status with other states. The data in this table do not match the West Virginia numbers in the rest of this report due to different years of data and differences in populations selected to determine rates. Data for the U. S. were entered into SAMMEC resulting in the U. S. totals at the bottom. Note that the U. S. totals *do include* SAM deaths from fires and secondhand smoke, but state data will not include these causes.

Table A2 (Appendix A): Reference Populations for West Virginia. This table includes all the populations for counties and state that were used in calculations for this report.