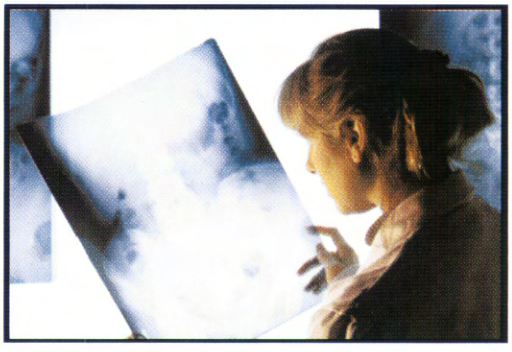
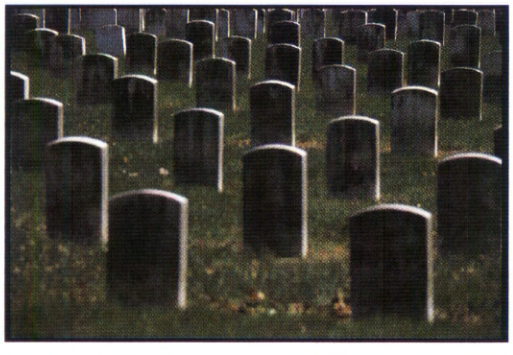
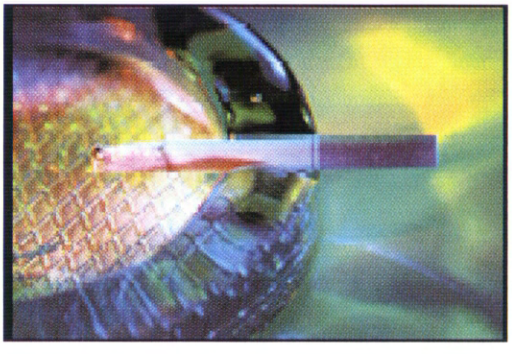
Tobacco Is Killing (and Costing) Us







August 2005

WEST VIRGINIA
Department of
Health & Human Resources

Bureau for Public Health
350 Capitol Street, Room 206
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 Costs in West Virginia

Joe Manchin III
Governor

Martha Yeager Walker
Secretary, Department of Health and Human Resources

Chris Curtis, MPH
Acting Commissioner, Bureau for Public Health

Catherine Slemp, MD, MPH
Acting Medical Officer, Bureau for Public Health

"Smoking remains the single most important preventable cause of death in our society."

-former U.S. Surgeon General C. Everett Koop

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The Health Statistics Center would like to acknowledge Dorothy P. Rice, ScD, Professor Emeritus, Institute for Health & Aging, University of California, and Jeffrey L. Fellows, PhD, Office of Smoking and Health, Centers for Disease Control and Prevention, for their invaluable contributions to this report.

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May 2005

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SAMMEC

The West Virginia Bureau for Public Health, Office of Epidemiology and Health Promotion, used the updated Centers for Disease Control and Prevention computer program "Smoking-Attributable Mortality, Morbidity, and Economic Costs" (SAMMEC 2004) and average annual vital statistics death data from 1999-2003 to calculate smoking-attributable deaths. Aggregated prevalence statistics for 1999-2003 were used to calculate average yearly county smoking rates. Data on the health care costs of smoking were calculated using two different economic models, developed by Vincent Miller et al. (1) and Leonard Miller et al. (2), applied to estimated 1998 health care expenditures for the state obtained from the Health Care Financing Administration (the most recent state-level data available at the time the report was prepared). Smokeless tobacco use was not addressed by SAMMEC or either economic model..

MESSAGE FROM THE COMMISSIONER

Most of the leading causes of death at the turn of the 20th century were diseases that are rarities today, primarily due to improved sanitation and availability of vaccines and medicine. The good news for West Virginia is that *the #1 leading cause of death*---tobacco-related diseases---can be stopped without vaccine or medicine. The bad news is that, despite increased funding from federal and state programs and private sources to educate the public on the dangers of cigarettes and smokeless tobacco, we are still maintaining a high rate of tobacco use among adults and youth.

Nearly 28 percent of adults in West Virginia smoke (3), but, more alarmingly, the same percentage of our teenagers are current smokers and approximately 25 percent, or *one in four*, are daily smokers, addicted before they are adults (4). About 7 percent of our kids reported in 2003 that they had smoked a whole cigarette for the first time by the time they were eight years old; 28 percent of our kids had done so by the time they were 12 years old (4). The rates of smokeless tobacco use among West Virginia males are also among the highest in the nation. In fact, the state's 2003 rate of 16 percent among adult males was the *highest* among the 12 states that asked questions on smokeless tobacco use (3) in that year.

On average, 11 West Virginians now die every day because they smoke cigarettes. That's nearly 1 in 5 deaths in our state caused by smoking! Although the death certificates may list the cause of death as lung cancer, heart disease, emphysema, or asthma, "cigarette smoking" could just as well have been listed. Those who die from smoking-related diseases come from all walks of life, all professions, all socioeconomic groups, all family situations, all religions, all ethnic backgrounds. The loss of even one of these lives is immeasurable. In dollars alone, the *direct* health care costs of cigarette smoking in the state of West Virginia are staggering, estimated at *over a billion dollars* in 2004. Combined with mortality-related productivity losses, the total exceeds $2 billion!

As the Public Health Officer for West Virginia, it is my responsibility to inform you that cigarette smoking kills approximately 3,800 of our citizens each year, causes disease in thousands of other citizens, and costs billions in direct health care and mortality-related productivity costs, money that can be saved if we reduce the rate of smoking. We will continue to experience these costs in lives and dollars unless we continue to fund and implement a comprehensive plan for tobacco use prevention and cessation. Let me reiterate that, as with preventable diseases, an ounce of prevention is worth a pound of cure, but this requires a forward-thinking strategy.

This report provides the reader with data on West Virginia's tobacco use rates, deaths due to smoking, and the calculated direct health care and mortality-related productivity costs of smoking in our state. 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 secondhand smoke. We know that the use of other forms of tobacco (snuff, chewing tobacco, pipes, and cigars) is a contributing factor toward deaths from oral cancers, some of the deadliest forms of cancer. Because of the lack of published research on the economic costs attributable to these forms of tobacco use and the resulting disease, this report does not include these data. If you require data that are not covered in this report, please contact my office.

Chris Curtis, MPH
Acting Commissioner
West Virginia Bureau for Public Health

EXECUTIVE SUMMARY

- In 2003, West Virginia had an adult smoking rate of 27.3 percent, the third highest rate among the 54 states and territories participating in the Behavioral Risk Factor Surveillance System. The U.S. rate in the same year was 22.2 percent. The West Virginia 2003 rate of adult male smokeless tobacco use was 15.9 percent, the highest rate among the 12 states that asked questions on smokeless tobacco use that year.

- According to West Virginia excise tax data, cigarette consumption in the state declined in fiscal year 2003/2004 to 183 million packs, likely reflecting the impact of the increase in the state cigarette tax that went into effect in May 2003.

- Using updated SAMMEC software provided by the Centers for Disease Control and Prevention, the West Virginia Bureau for Public Health estimated that an average of 3,842 West Virginians died each year from 1999 through 2003 from causes due to cigarette smoking. Although it is recognized that smokeless tobacco is a cause of oral cancers, as well as carrying cardiovascular disease risks, the SAMMEC model does not address the calculation of deaths attributable to smokeless tobacco use.

- Direct health care costs in West Virginia due to cigarette smoking were provided by two separate models developed by (1) Vincent Miller et al. and (2) Leonard Miller et al. It is estimated that between $846 million and $1.064 billion was spent on direct medical costs for smoking-related illnesses in the state in 2004. Using SAMMEC, it was estimated that smoking-related productivity losses for that same year amounted to $1.012 billion. Combining direct health care costs and productivity losses resulted in total costs to the state of between $1.858 billion and $2.076 billion. This did *not* include economic costs attributable to snuff, chewing tobacco, cigars, pipes and secondhand smoke or productivity losses due to *morbidity* from smoking-related illnesses..

SECTION I
Tobacco Use Prevalence in West Virginia

In 2003, West Virginia had the third highest current smoking rate among the 54 participants (50 states plus the District of Columbia and three U.S. territories) in the annual Behavioral Risk Factor Surveillance System (BRFSS) survey (3). The BRFSS allows a calculation of the state's rate of smoking every year using statistics collected from approximately 3,600 randomly selected adults by means of a telephone survey. The state's 2003 smoking prevalence was 27.3 percent, somewhat lower than the state's 2002 rate of 28.4 percent but markedly higher than the U.S. average of 22.2 percent.

Among smokeless tobacco users, the difference was even more striking. The state's 2003 prevalence of smokeless tobacco use among adult males was 15.9 percent, lower than the 2002 rate of 17.2 percent, but first among the 12 BRFSS participants in 2003 who included questions about smokeless tobacco use in their surveys.

The tobacco use data on the following pages reflect aggregated survey responses from the years 1999 through 2003. County rates were calculated from aggregated state data where possible. Aggregated sample sizes were large enough to allow the calculation of county smoking rates for 24 individual counties. Among those counties with sample sizes still too small to calculate individual (county-level) prevalences, samples were combined to provide multicounty smoking rates. That rate was then used as the prevalence for each county within that multicounty region. The U.S. average prevalence for 2001 as chosen for comparison purposes on the county map because it represents the midpoint of the five-year range.

- If everyone in the United States quit smoking today, there would [eventually] be 90 percent less lung cancer, 50 percent less bladder cancer, 33 percent less heart disease, 41 percent fewer childhood deaths and 22 percent fewer low-birthweight infants.

  -American Academy of Pediatrics

- Ninety percent of all smokers begin smoking before the age of 16 and more than 3,000 teens become regular smokers every day in the United States.

  -American Academy of Pediatrics

Table 1
Prevalence (%) of Current Smoking by County
WVBRFSS, 1999-2003

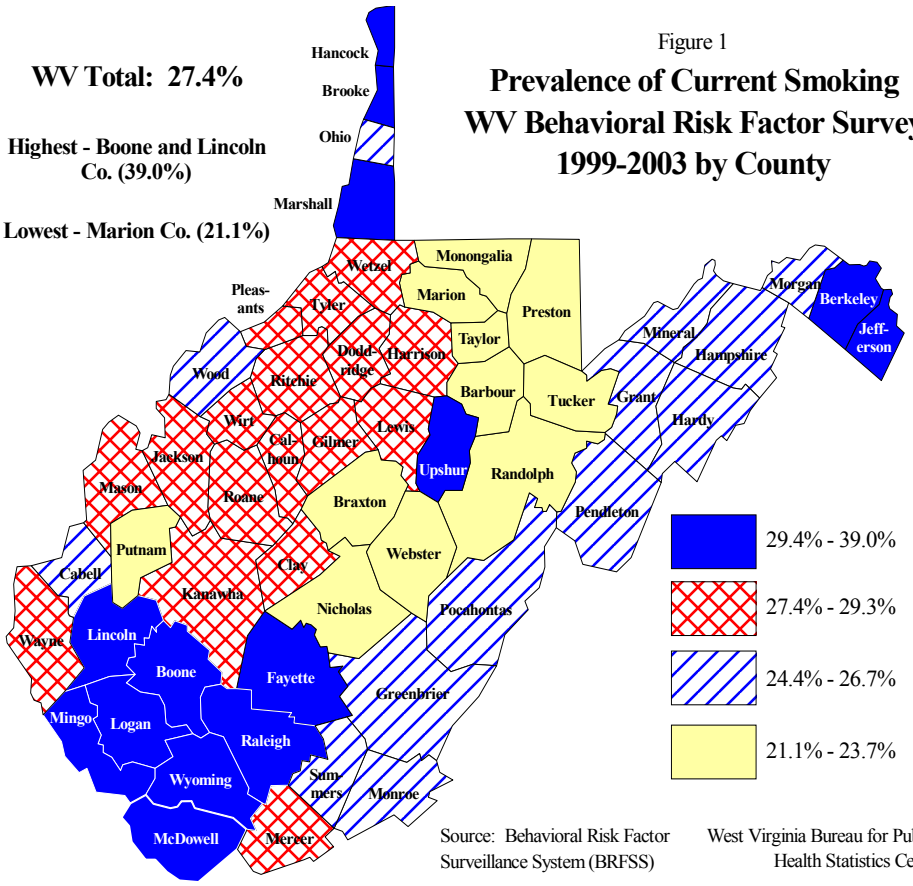
County	%	Rank*	County	%	Rank*
Barbour	23.6	31	Pendleton	24.4	29
Berkeley	32.5	6	Pleasants	28.6	18
Boone	39.0	1	Pocahontas	24.4	29
Braxton	21.8	35	Preston	23.7	30
Brooke	31.5	8	Putnam	22.9	33
Cabell	24.7	27	Raleigh	30.4	11
Calhoun	29.0	15	Randolph	23.3	32
Clay	29.0	15	Ritchie	29.3	14
Doddridge	29.3	14	Roane	29.0	15
Fayette	30.7	10	Summers	24.6	28
Gilmer	29.0	15	Taylor	23.6	31
Grant	25.6	26	Tucker	23.7	30
Greenbrier	24.6	28	Tyler	28.6	18
Hampshire	26.7	23	Upshur	32.2	7
Hancock	30.1	12	Wayne	28.9	17
Hardy	24.4	29	Webster	21.8	35
Harrison	27.8	20	Wetzel	28.6	18
Jackson	28.3	19	Wirt	28.3	19
Jefferson	29.4	13	Wood	26.7	24
Kanawha	27.4	22	Wyoming	32.6	5
Lewis	29.3	14	**Total WV**	27.4	
Lincoln	39.0	1	**Total US**	22.7	
Logan	35.5	2			
McDowell	32.9	4			
Marion	21.1	36			
Marshall	30.8	9			
Mason	28.9	16			
Mercer	27.5	21			
Mineral	25.6	26			
Mingo	33.8	3			
Monongalia	22.6	34			
Monroe	24.6	28			
Morgan	26.7	23			
Nicholas	21.8	35			
Ohio	26.4	25			

Note: The data from counties sharing the same rank were combined due to low sample sizes. Aggregated sample sizes were large enough for 24 of the 55 counties to stand alone. The data from the remaining 31 counties were combined into 12 groupings of counties. Each county within a grouping shares the same prevalence.

*Rates are rounded to the nearest tenth; ranks were determined before rounding.

Figure 1

Prevalence of Current Smoking
WV Behavioral Risk Factor Survey
1999-2003 by County

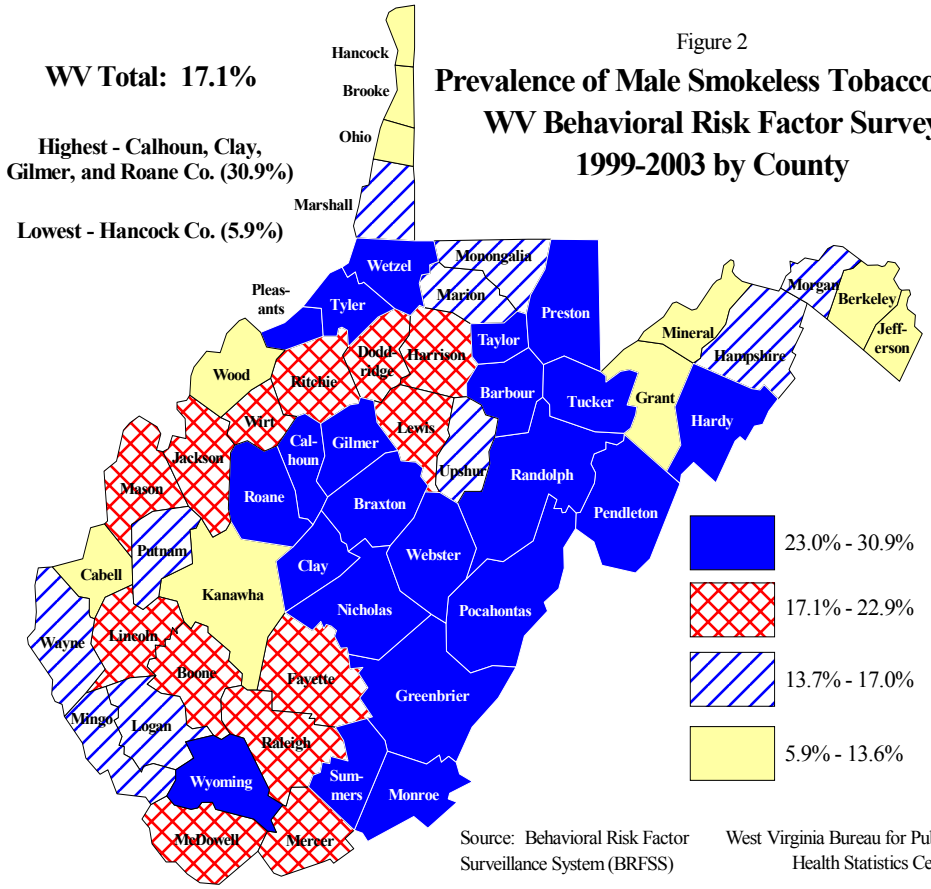


Source: Behavioral Risk Factor Surveillance System (BRFSS)

West Virginia Bureau for Public Health
Health Statistics Center, 2005

Figure 2

Prevalence of Male Smokeless Tobacco Use
WV Behavioral Risk Factor Survey
1999-2003 by County



Source: Behavioral Risk Factor Surveillance System (BRFSS)

West Virginia Bureau for Public Health
Health Statistics Center, 2005

Table 2
Prevalence (%) of Smokeless Tobacco Use (Men) by County
WVBRFSS, 1999-2003

County	%	Rank*	County	%	Rank*
Barbour	23.0	9	Pendleton	28.4	3
Berkeley	11.6	33	Pleasants	26.0	5
Boone	20.6	13	Pocahontas	28.4	3
Braxton	30.3	2	Preston	24.0	7
Brooke	11.8	32	Putnam	14.2	26
Cabell	10.1	34	Raleigh	21.9	10
Calhoun	30.9	1	Randolph	24.0	6
Clay	30.9	1	Ritchie	20.9	12
Doddridge	20.9	12	Roane	30.9	1
Fayette	19.7	14	Summers	23.6	8
Gilmer	30.9	1	Taylor	23.0	9
Grant	13.6	28	Tucker	24.0	7
Greenbrier	23.6	8	Tyler	26.0	5
Hampshire	15.8	20	Upshur	15.7	22
Hancock	5.9	36	Wayne	14.6	24
Hardy	28.4	3	Webster	30.3	2
Harrison	17.6	18	Wetzel	26.0	5
Jackson	21.3	11	Wirt	21.3	11
Jefferson	6.0	35	Wood	12.8	30
Kanawha	13.0	29	Wyoming	28.1	4
Lewis	20.9	12	**Total WV**	17.1	
Lincoln	20.6	13			
Logan	14.1	27			
McDowell	18.8	17			
Marion	15.2	23			
Marshall	15.9	19			
Mason	19.6	15			
Mercer	19.0	16			
Mineral	13.6	28			
Mingo	15.8	21			
Monongalia	14.2	25			
Monroe	23.6	8			
Morgan	15.8	20			
Nicholas	30.3	2			
Ohio	11.9	31			

Note: The data from counties sharing the same rank were combined due to low sample sizes. Aggregated sample sizes were large enough for 24 of the 55 counties to stand alone. The data from the remaining 31 counties were combined into 12 groupings of counties. Each county within a grouping shares the same prevalence.

*Rates are rounded to the nearest tenth; ranks were determined before rounding.

SECTION II
West Virginia Cigarette Consumption
FY 1993/1994-FY 2003/2004
(Estimates in Millions of Packs)

The data presented in the chart below present estimated cigarette sales in West Virginia for the 11-year period from FY 1993/1994 through FY 2003/2004. As seen, a gradual decrease in consumption from FY 1993/1994 through FY 2001/2002 was followed by a sharp hike in FY 2002/2003 and then a significant decrease in FY 2003/2004. The increase in FY 2002/2003 likely reflects hoarding in anticipation of West Virginia's tax increase, as well as cross-border sales due to an increase in Ohio's cigarette tax the previous year. The sharp drop in consumption in FY 2003/2004 reflects the impact of West Virginia's tax increase from 17 cents per pack to 55 cents per pack effective at the end of FY 2002/2003. If sustained, the recent downturn in consumption should begin to reverse the loss of life and high costs associated with smoking.

Figure 3
West Virginia Cigarette Consumption, 1994-2004
(In millions of packs)

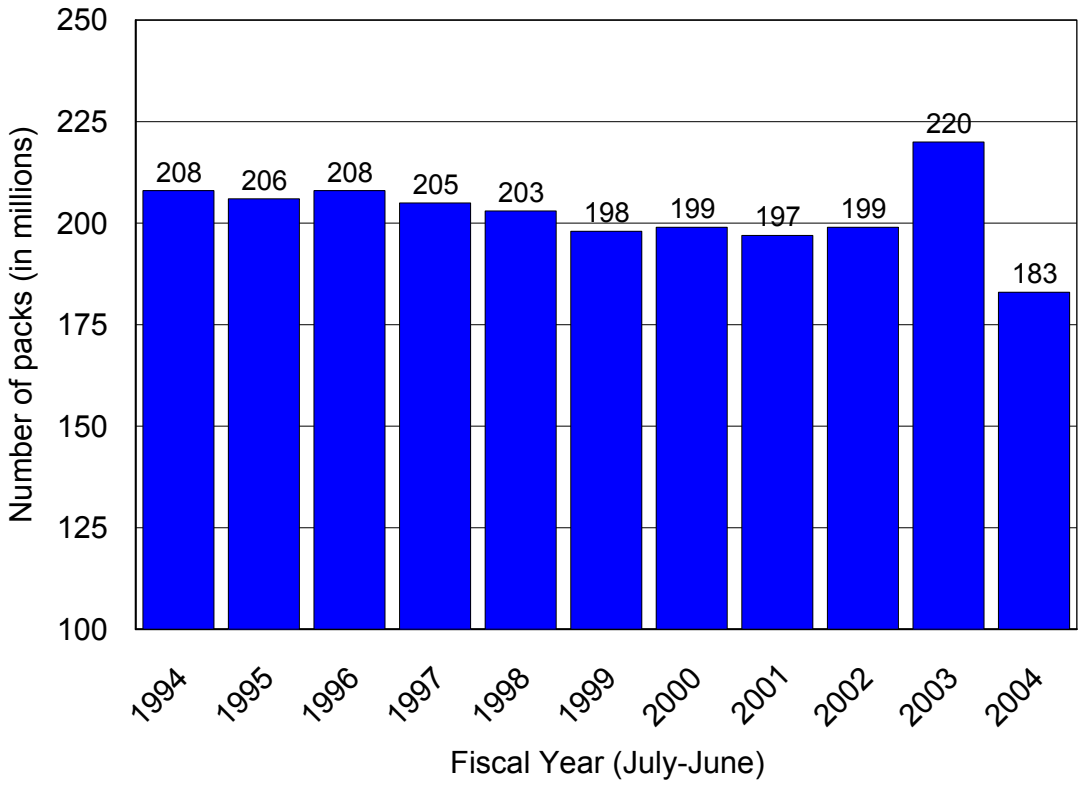
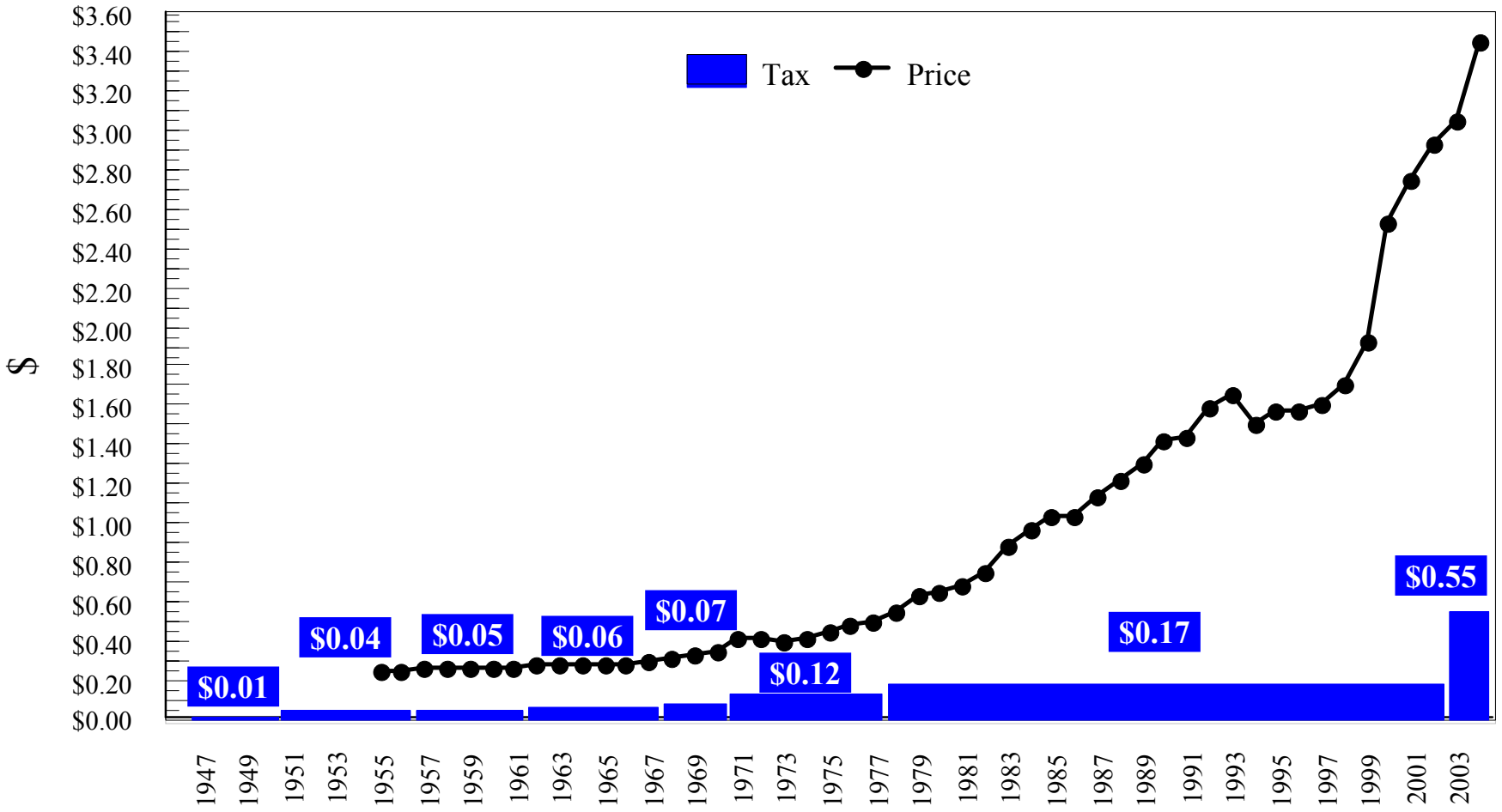


Figure 4

West Virginia Cigarette Excise Tax Increases
Since 1947
Compared to the Price of Cigarettes (Per Pack)

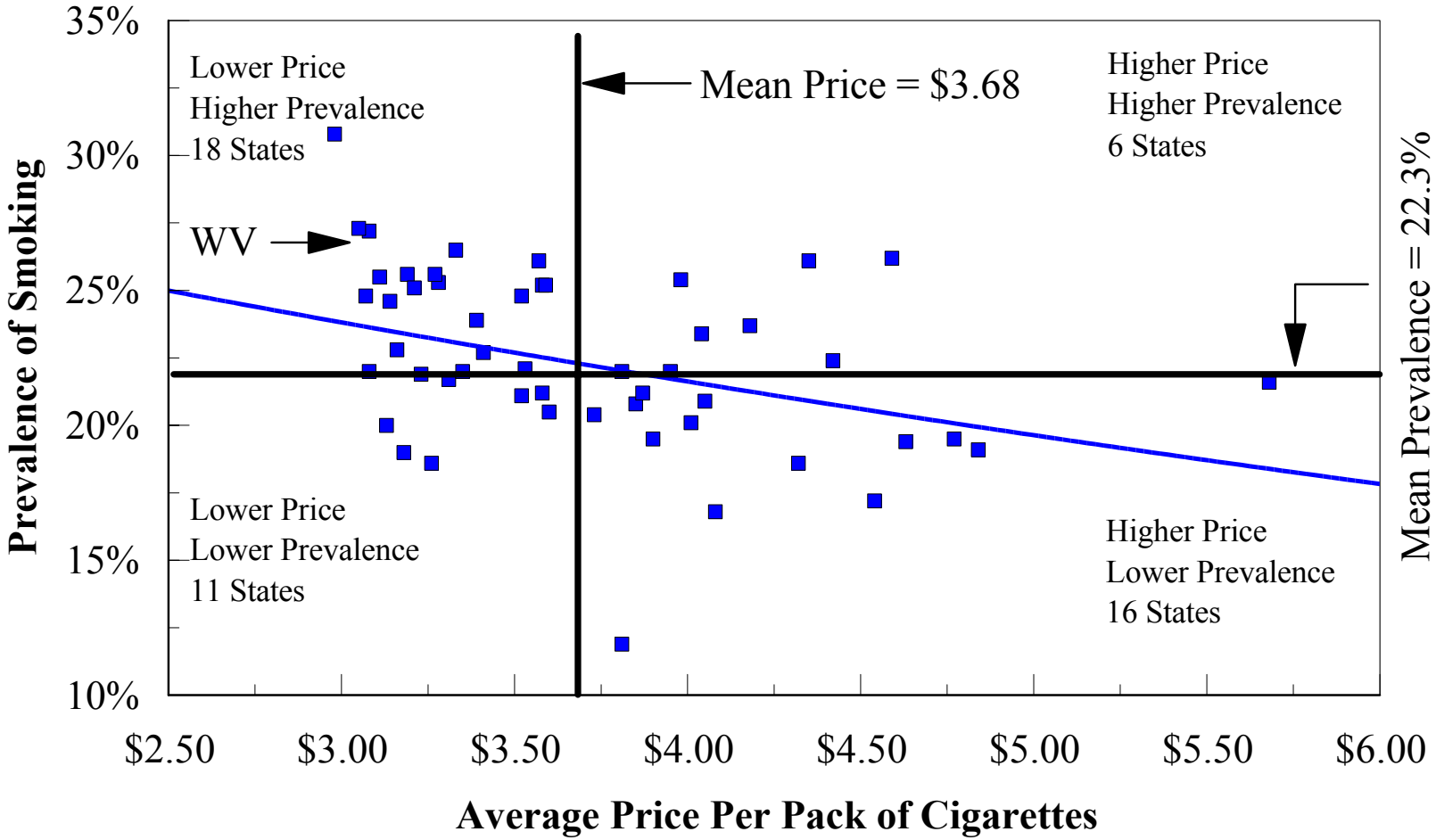


Source: *Tax Burden on Tobacco, 2004* (6)

West Virginia Bureau for Public Health
Health Statistics Center, 2005

Figure 5

Comparison of States' 2003 Smoking Prevalence
Average Price Per Pack of Cigarettes, Split by Mean Values



Source: *Tax Burden on Tobacco, 2004* (6)

..... Least-Squares Regression Line

West Virginia Bureau for Public Health
Health Statistics Center, 2005

SECTION III
Deaths in West Virginia due to Smoking, 1999-2003

Every year thousands of West Virginians die because they smoke. The Health Statistics Center (West Virginia Bureau for Public Health, Office of Epidemiology and Health Promotion) utilized SAMMEC 2004[1] to estimate the average annual number of smoking-related deaths among people aged 35+ in the state and in each county for the period 1999 through 2003. This calculation involved evaluating county populations, smoking prevalence rates by age and sex, the number of deaths by age group and the number of deaths due to causes associated with smoking. Using this model, it was estimated that a total of 3,842 lives were lost each year in West Virginia from 1999 to 2003 due to cigarette smoking.[2] This number represents nearly one in every five deaths during that time period. Table 3 and Figure 6 present smoking-attributable deaths by county. The SAMMEC model does not address the calculation of estimated deaths due to smokeless tobacco use.

- More people die each year from cigarette smoking and related illnesses than die from AIDS, alcohol, traffic accidents, illicit drugs, murder and suicide combined.

  - Centers for Disease Control and Prevention

- The West Virginia lung cancer death rate from 1992-2001 was 25 percent higher than the United States rate for 1997.

  - 2004 West Virginia County Health Profiles

- Nearly 1 in 5 deaths in West Virginia is related to smoking cigarettes.

  - SAMMEC, West Virginia Bureau for Public Health

- The West Virginia 2003 death rate for chronic lower respiratory diseases was 41 percent higher than the U.S. rate.

  - 2003 West Virginia Vital Statistics

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[1] Centers for Disease Control and Prevention. Smoking-Attributable Mortality, Morbidity, and Economic Costs (SAMMEC): Adult SAMMEC and Maternal and Child Health (MCH) SAMMEC software, 2004. Available at http://www.cdc.gov/tobacco/sammec

[2] Using earlier versions of the SAMMEC model, statewide smoking-attributable deaths were estimated at 3,325 in 1985, 4,221 in 1990, and 4,240 from 1995-99.

Table 3
Deaths among Persons Aged 35+ in West Virginia due to Smoking
Average Annual, 1999-2003

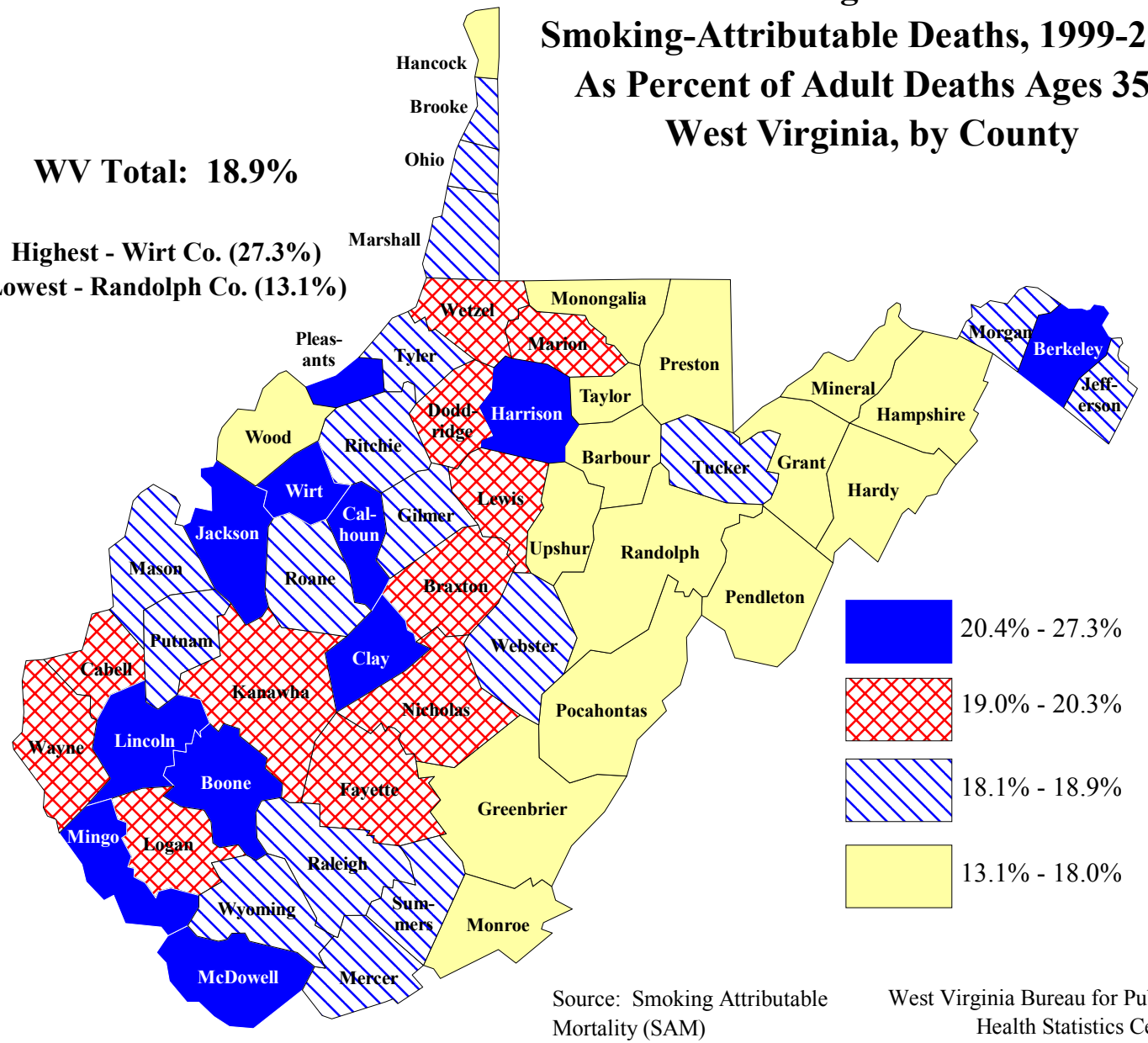
County	Deaths due to Smoking	% of Total Deaths Ages 35+	Rank	County	Deaths due to Smoking	% of Total Deaths Ages 35+	Rank
Barbour	32	17.1%	46	Pendleton	12	14.7%	54
Berkeley	136	21.7%	7	Pleasants	18	20.5%	10
Boone	69	24.0%	2	Pocahontas	19	17.0%	48
Braxton	32	19.4%	17	Preston	51	15.2%	52
Brooke	59	18.6%	28	Putnam	78	18.4%	29
Cabell	224	19.4%	18	Raleigh	162	18.1%	38
Calhoun	19	20.5%	11	Randolph	44	13.1%	55
Clay	26	22.4%	6	Ritchie	24	18.2%	36
Doddridge	16	19.8%	14	Roane	33	18.8%	24
Fayette	114	19.1%	22	Summers	32	18.4%	31
Gilmer	15	18.4%	33	Taylor	32	17.1%	45
Grant	19	16.6%	49	Tucker	16	18.1%	39
Greenbrier	74	17.2%	44	Tyler	21	18.3%	35
Hampshire	34	17.8%	42	Upshur	44	17.0%	47
Hancock	62	15.1%	53	Wayne	90	20.3%	12
Hardy	25	18.0%	40	Webster	20	18.4%	30
Harrison	184	21.4%	8	Wetzel	40	19.4%	19
Jackson	63	20.9%	9	Wirt	13	27.3%	1
Jefferson	67	18.4%	32	Wood	175	17.9%	41
Kanawha	467	19.2%	21	Wyoming	50	18.4%	34
Lewis	42	19.6%	15	**Total WV**	3,842	18.9%	
Lincoln	57	23.7%	3				
Logan	93	19.9%	13				
McDowell	86	22.8%	5				
Marion	142	19.5%	16				
Marshall	71	18.8%	23				
Mason	54	18.8%	25				
Mercer	149	18.6%	27				
Mineral	48	16.5%	50				
Mingo	75	23.6%	4				
Monongalia	95	15.6%	51				
Monroe	25	17.6%	43				
Morgan	30	18.7%	26				
Nicholas	55	19.3%	20				
Ohio	110	18.1%	37				

Figure 3

Average Annual Smoking-Attributable Deaths, 1999-2003 As Percent of Adult Deaths Ages 35+ West Virginia, by County

WV Total: 18.9%

Highest - Wirt Co. (27.3%)
Lowest - Randolph Co. (13.1%)



Source: Smoking Attributable Mortality (SAM)

West Virginia Bureau for Public Health
Health Statistics Center, 2005

SECTION IV
Health Care Costs Related to Smoking in West Virginia

The Health Statistics Center relied upon the work of two noted researchers in estimating smoking-attributable direct health care costs. Vincent Miller and Leonard Miller (not related) independently developed two models for estimating health care costs related to cigarette smoking (1,2). 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 (e.g., hospital care, ambulatory care, or prescription drugs) that is due to cigarette smoking. Simply stated, an SAF expresses the ratio of the cost difference between smokers and nonsmokers for each medical expense category. Health Statistics Center staff elected to show the results of both models after consultation with Dr. Jeffery Fellows of the Centers for Disease Control and Prevention. The SAFs from both models were applied to estimated health care expenditures for West Virginia obtained from the federal Health Care Financing Administration. In the present report, Model 1 refers to the use of SAFs calculated by Vincent Miller et al. and Model 2 the use of SAFs calculated by Leonard Miller et al. West Virginia's total smoking-related direct health care costs for 2004 are estimated at $846 million using Model 1 and over $1.064 billion using Model 2.

Mortality-Related Productivity Costs

The SAMMEC software used to update the smoking–related mortality data presented in this report also calculated *mortality-related* productivity losses that are attributable to smoking, that is, losses resulting from premature death due to smoking-related disease. These data are calculated using updated age-specific estimates of the present value of future earnings (PVFE) from paid market and unpaid household work, as obtained from Haddix et al. (7).

Using SAMMEC, it was estimated that smoking-attributable productivity losses in West Virginia amounted to $834 million in the year 1999. Adjusting to the year 2001 using Employment Cost Index (ECI) estimates for total compensation[3] (after consultation with the Office on Smoking and Health [OSH] at CDC), it was estimated that the corresponding productivity losses for the year 2001 amounted to $906 million. This same method was used to estimate the 2004 productivity losses. The ECI yielded an 11.76 percent increase in losses between the 3rd quarter of 2001 and the 3rd quarter of 2004. It is therefore estimated that the productivity losses for the year 2004 amounted to $1.012 billion.

A combination of the smoking-related direct health care costs and the smoking-related productivity losses gives a clear picture of the enormous economic toll of tobacco in West Virginia. For the year 2004, this amounted to $1.858 billion using Model 1 and $2.076 billion using Model 2. Figure 7 compares these calculated combined costs per adult residents versus adult smokers in the state. These total costs, however, 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, and secondhand smoke.

[3] Bureau of Labor Statistics. United States Department of Labor. Employment Cost trends data. Available at http://data .bls.gov/cgi-bin/surveymost?ec

Table 4 presents a county breakdown of the health impact of smoking in the state, i.e., estimated average annual smoking-related mortality from 1999-2003, as well as health care costs as calculated using both economic models. Figure 8 illustrates per capita smoking-attributable health care costs by county for 2004 generated using Model 2 SAFs and average annual deaths from 1999-2003. These costs range from a high of $893 in McDowell County to a low of $320 in Monongalia County. Figure 9 shows estimated smoking-attributable health care costs for 1998, with projected costs for 1999 through 2004. Medical inflation was used to project 1999 - 2004 costs for Model 1, while Consumer Price Index inflation was used for Model 2. Application of a relative error of 34 percent to Model 2 produces a range of expenditures from $703 million to $1.4 billion for 2004. Smoking-attributable medical costs calculated using both models fall within this range for all years.

Figure 7
Estimated Smoking-Attributable Productivity Losses plus Direct Health Care Costs
Per Adult Smoker vs. per Adult Resident in West Virginia, 2004

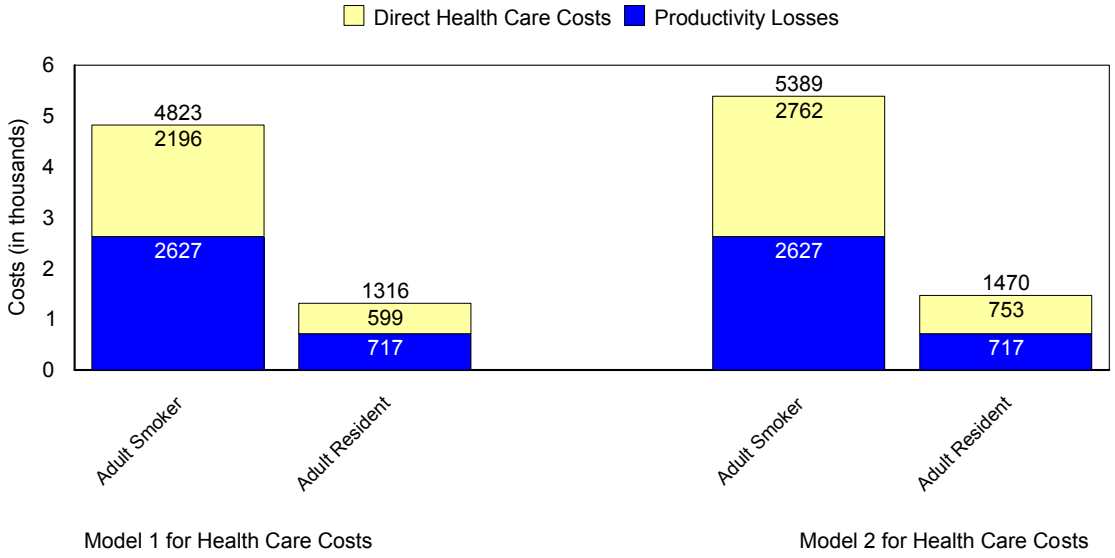


Table 4

Health Impact of Smoking in West Virginia

County	Estimated Deaths Due to Smoking 1999-2003 Ages 35+	2001 Estimated Population	Health Care Costs Model 1*		Health Care Costs Model 2**		Rank (Based on Model 2)
			Economic Costs (Distributed by Deaths)	Cost Per Capita	Economic Costs (Distributed by Deaths)	Cost Per Capita	
Barbour	32	15,445	$6,958,975	$451	$8,752,187	$567	36
Berkeley	136	78,719	$29,861,933	$379	$37,556,851	$477	48
Boone	69	25,501	$15,151,187	$594	$19,055,394	$747	4
Braxton	32	14,763	$7,003,020	$474	$8,807,580	$597	26
Brooke	59	25,194	$12,904,935	$512	$16,230,321	$644	17
Cabell	224	95,829	$49,373,490	$515	$62,096,210	$648	16
Calhoun	19	7,419	$4,184,194	$564	$5,262,391	$709	6
Clay	26	10,296	$5,725,739	$556	$7,201,166	$699	7
Doddridge	16	7,458	$3,523,532	$472	$4,431,487	$594	27
Fayette	114	47,226	$25,105,165	$532	$31,574,344	$669	11
Gilmer	15	7,119	$3,347,355	$470	$4,209,913	$591	28
Grant	19	11,349	$4,272,282	$376	$5,373,178	$473	49
Greenbrier	74	34,444	$16,340,379	$474	$20,551,020	$597	25
Hampshire	34	20,674	$7,575,594	$366	$9,527,697	$461	50
Hancock	62	32,303	$13,697,730	$424	$17,227,405	$533	42
Hardy	25	12,809	$5,417,430	$423	$6,813,411	$532	43
Harrison	184	68,061	$40,476,572	$595	$50,906,706	$748	3
Jackson	63	28,057	$13,785,818	$491	$17,338,192	$618	22
Jefferson	67	43,448	$14,842,878	$342	$18,667,638	$430	52
Kanawha	467	197,766	$102,887,130	$520	$129,399,417	$654	14
Lewis	42	16,926	$9,161,183	$541	$11,521,866	$681	10
Lincoln	57	22,181	$12,596,626	$568	$15,842,566	$714	5
Logan	93	36,897	$20,436,485	$554	$25,702,624	$697	9
McDowell	86	26,561	$18,850,895	$710	$23,708,455	$893	1
Marion	142	56,267	$31,271,345	$556	$39,329,446	$699	8
Marshall	71	35,303	$15,591,628	$442	$19,609,329	$555	37
Mason	54	26,080	$11,891,920	$456	$14,956,268	$573	34
Mercer	149	62,022	$32,812,890	$529	$41,268,222	$665	13
Mineral	48	27,038	$10,614,640	$393	$13,349,854	$494	46
Mingo	75	27,578	$16,428,467	$596	$20,661,808	$749	2

*Model 1 uses smoking-attributable fractions (SAF's) calculated by Vincent Miller.

**Model 2 uses SAF's calculated by Leonard Miller.

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Table 4 (Cont'd)

Health Impact of Smoking in West Virginia

County	Estimated Deaths Due to Smoking 1999-2003 Ages 35+	2001 Estimated Population	Health Care Costs Model 1*		Health Care Costs Model 2**		Rank (Based on Model 2)
			Economic Costs (Distributed by Deaths)	Cost Per Capita	Economic Costs (Distributed by Deaths)	Cost Per Capita	
Monongalia	95	82,320	$20,965,015	$255	$26,367,347	$320	55
Monroe	25	13,258	$5,549,563	$419	$6,979,592	$526	44
Morgan	30	15,232	$6,606,622	$434	$8,309,038	$545	41
Nicholas	55	26,322	$12,112,141	$460	$15,233,236	$579	32
Ohio	110	46,665	$24,136,193	$517	$30,355,685	$651	15
Pendleton	12	8,073	$2,730,737	$338	$3,434,402	$425	53
Pleasants	18	7,540	$4,008,017	$532	$5,040,816	$669	12
Pocahontas	19	8,942	$4,096,106	$458	$5,151,603	$576	33
Preston	51	29,309	$11,143,170	$380	$14,014,577	$478	47
Putnam	78	51,730	$17,265,306	$334	$21,714,286	$420	54
Raleigh	162	78,546	$35,719,804	$455	$44,924,198	$572	35
Randolph	44	28,273	$9,689,713	$343	$12,186,589	$431	51
Ritchie	24	10,351	$5,197,209	$502	$6,536,443	$631	19
Roane	33	15,461	$7,267,284	$470	$9,139,942	$591	29
Summers	32	14,224	$7,047,064	$495	$8,862,974	$623	21
Taylor	32	16,109	$7,047,064	$437	$8,862,974	$550	40
Tucker	16	7,219	$3,435,444	$476	$4,320,700	$599	24
Tyler	21	9,529	$4,580,591	$481	$5,760,933	$605	23
Upshur	44	23,358	$9,601,624	$411	$12,075,802	$517	45
Wayne	90	42,778	$19,819,867	$463	$24,927,114	$583	31
Webster	20	9,681	$4,492,503	$464	$5,650,146	$584	30
Wetzel	40	17,314	$8,808,830	$509	$11,078,717	$640	18
Wirt	13	5,889	$2,950,958	$501	$3,711,370	$630	20
Wood	175	87,742	$38,582,674	$440	$48,524,781	$553	38
Wyoming	50	25,226	$11,055,081	$438	$13,903,790	$551	39
WV Total	**3,842**	**1,801,824**	**$846,000,000**	**$470**	**$1,064,000,000**	**$591**	

*Model 1 uses smoking-attributable fractions (SAF's) calculated by Vincent Miller.
**Model 2 uses SAF's calculated by Leonard Miller.

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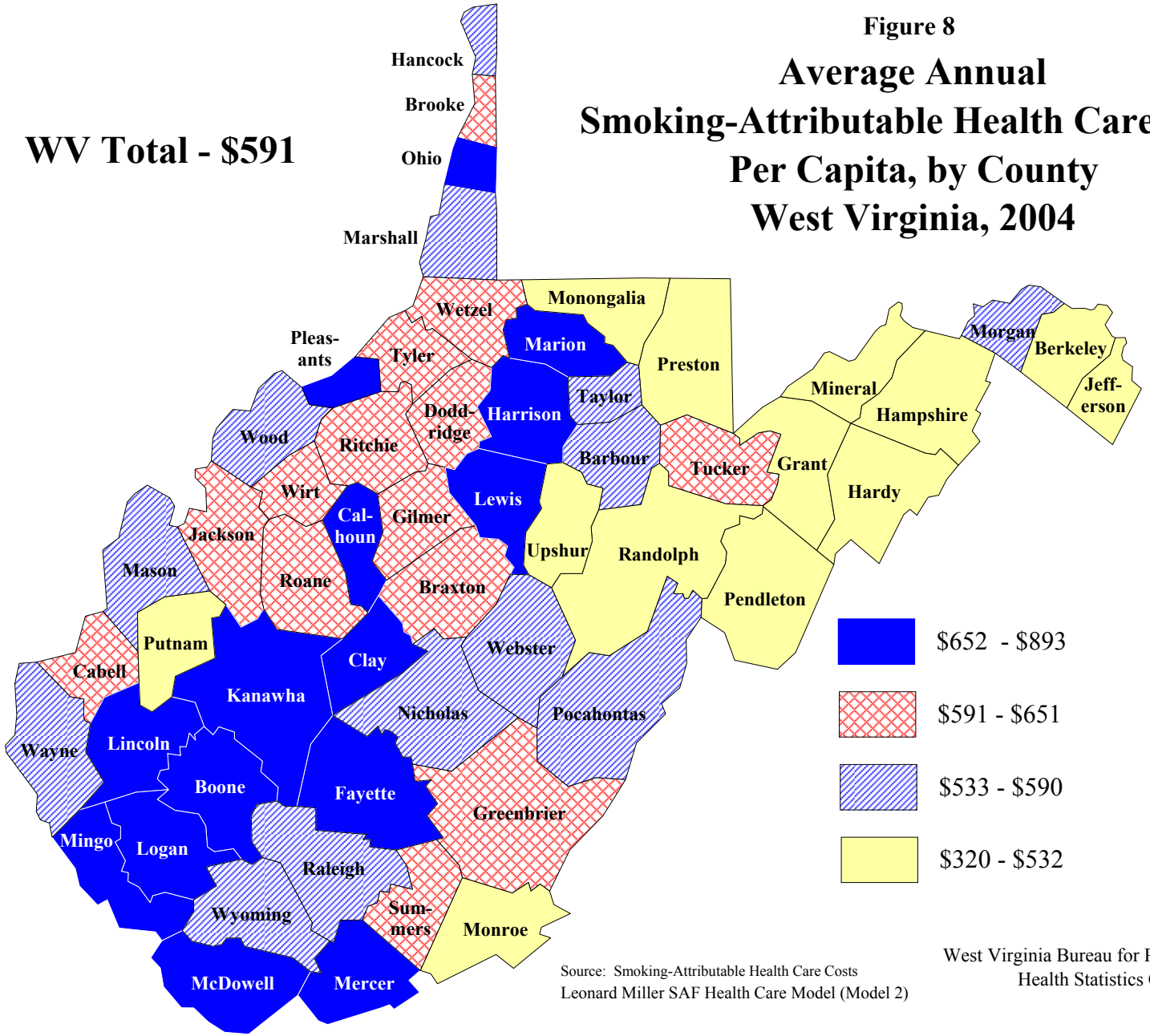
Figure 8

Average Annual Smoking-Attributable Health Care Costs Per Capita, by County West Virginia, 2004

WV Total - $591



Source: Smoking-Attributable Health Care Costs
Leonard Miller SAF Health Care Model (Model 2)

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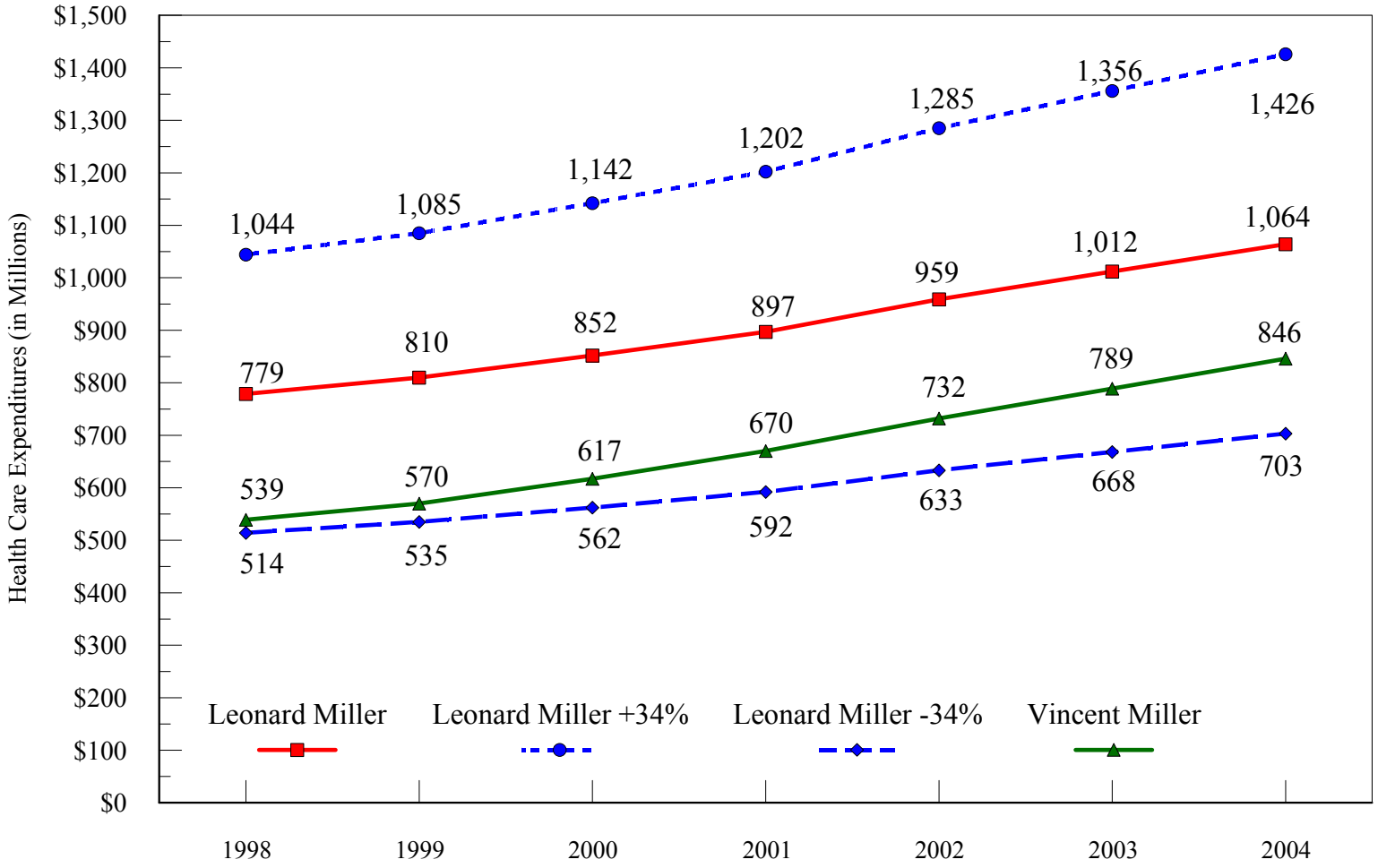
Figure 9
Smoking-Attributable Direct Health Care Costs, 1998-2004
Models 1 amd 2 Applied to West Virginia Health Care Finance Administration 1998 Estimates*



*1999 - 2003 Adjustments: Consumer Price Index inflation used for Leonard Miller model. Medical inflation used for Vincent Miller model.

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REFERENCES

1. Miller VP, Ernst C, Collin F. Smoking-attributable medical care costs in the USA. *Social Science and Medicine* 48:375-91.

2. Miller LS, Zhang X, Novotny T, Rice DP, Max W. State estimates of Medicaid expenditures attributable to cigarette smoking, fiscal year 1993. *Public Health Reports*, Vol. 11, March/April 1998: 140-8.

3. West Virginia Bureau for Public Health. *2003 Behavioral Risk Factor Survey Report*. Charleston, WV: West Virginia Bureau for Public Health, Office of Epidemiology and Health Promotion, 2005.

4. Centers for Disease Control and Prevention. Youth risk behavior surveillance – United States, 2003. In: *Surveillance Summaries*, May 21, 2004. MMWR 2004;53(No. SS-2).

5. West Virginia Department of Tax and Revenue, Tax Commission. West Virginia cigarette excise tax collection history. 2004. Unpublished data.

6. *The Tax Burden on Tobacco: Historical Compilation, 2004*. Vol. 39. Arlington, VA: Orzechowski and Walker, 2005.

7. Haddix AC, Teutch SM, Shaffer PA, Dunet DO. *Prevention Effectiveness: A Guide to Decision Analysis and Economic Evaluation.* New York: Oxford University Press, 1996.