

State Costs of Excessive Alcohol Consumption, 2006

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Background: Excessive alcohol consumption is responsible for an average of 80,000 deaths in the U.S. each year and cost \$223.5 billion (\$1.90/drink) in 2006. Comparable state estimates of this cost are needed to help inform prevention strategies.

Purpose: The goal of the study was to estimate the economic cost of excessive drinking by state for 2006.

Methods: From December 2011 to November 2012, an expert panel developed methods to allocate component costs from the 2006 national estimate to states for (1) total; (2) government; (3) binge drinking; and (4) underage drinking costs. Differences in average state wages were used to adjust productivity losses.

Results: In 2006, the median state cost of excessive drinking was \$2.9 billion (range: \$31.9 billion [California] to \$419.6 million [North Dakota]); the median cost per drink, \$1.91 (range: \$2.74 [Utah] to \$0.88 [New Hampshire]); and the median per capita cost, \$703 (range: \$1662 [District of Columbia] to \$578 [Utah]). A median of 42% of state costs were paid by government (range: 45.0% [Utah] to 37.0% [Mississippi]). Binge drinking was responsible for a median of 76.6% of state costs (range: 83.1% [Louisiana] to 71.6% [Massachusetts]); underage drinking, a median of 11.2% of state costs (range: 20.0% [Wyoming] to 5.5% [District of Columbia]).

Conclusions: Excessive drinking cost states a median of \$2.9 billion in 2006. Most of the costs were due to binge drinking and about \$2 of every \$5 were paid by government. The *Guide to Community Preventive Services* has recommended several evidence-based strategies—including increasing alcohol excise taxes, limiting alcohol outlet density, and commercial host liability—that can help reduce excessive alcohol use and the associated economic costs.

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Introduction

Excessive alcohol consumption is responsible for an average of 80,000 deaths and 2.3 million years of potential life lost (YPLL) each year in the U.S.¹

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0749-3797/\$36.00

<http://dx.doi.org/10.1016/j.amepre.2013.06.004>

Excessive alcohol consumption has many adverse health and social consequences—it causes increased healthcare costs as a result of injuries and chronic health conditions; property damage from fire and motor vehicle crashes; increased crime and criminal justice system costs; and lost worker productivity due to absenteeism, diminished output while at work, and reduced earnings potential.²

A comprehensive analysis based on U.S. Public Health Service Guidelines³ estimated that the economic cost of excessive drinking in the U.S. was \$223.5 billion (about \$1.90 per drink) in 2006 (the study noted that the \$223.5 billion figure was likely to be a substantial underestimate of the true cost for a variety of reasons).² Excessive drinkers and their families bore less than half of the costs associated with excessive alcohol consumption (41.5%), whereas federal, state, and local government bore 42.1% of these costs. Binge drinking accounted for 76.1% of the

total cost, and lost productivity accounted for 72.2% of total cost.²

National cost estimates are useful for assessing the public health impact of excessive alcohol use, but most of the strategies for preventing excessive drinking that are recommended by the *Guide to Community Preventive Services* (hereafter referred to as the *Community Guide*)⁴ are implemented at the state and local levels. These recommended strategies include increasing alcohol excise taxes, limiting alcohol outlet density, and commercial host (dram shop) liability (refers to laws that hold alcohol retailers responsible for harms caused by patrons who were underage or intoxicated).

State-level estimates of the economic costs of excessive drinking are therefore needed to inform the planning and implementation of these and other evidence-based prevention strategies. Such estimates can also help policy makers assess the cost of prevention strategies for excessive drinking relative to the cost of alcohol-attributable harms. In addition, comparing the economic costs of excessive drinking across states may provide valuable insights into factors that may influence excessive alcohol consumption and its adverse effects, and thus underlie these cost differences. Accordingly, the purpose of the current study was to generate estimates of the economic costs of excessive alcohol use in states to help assess the extent of the problem and inform the design and implementation of evidence-based prevention strategies, such as those recommended by the *Community Guide*.

Methods

From December 2011 to November 2012, an expert panel developed methods to estimate the costs of excessive alcohol consumption for the 50 states and the District of Columbia (hereafter referred to as states). After reviewing cost estimates already made by some states,^{5–12} the panel decided to calculate each state's cost estimate as a share of the recent 2006 national estimate. This approach was similar to the analyses that had been done in some states, ensured that state costs were calculated based on U.S. Public Health Service recommendations,³ and used current scientific information. This approach also ensured that state and national estimates of the economic cost of excessive drinking were comparable (e.g., that state sums add to the national total); allowed for the estimation of some costs (e.g., impaired productivity at work) that required data that were only available at the national level; and ensured that all state costs were calculated for the same year, thus facilitating state comparisons of the cost of excessive alcohol consumption per drink and per capita.

Definition of Excessive Alcohol Consumption

Consistent with the national definition and previous cost study,² excessive alcohol consumption was defined as binge drinking (≥ 4 drinks per occasion for a woman, and ≥ 5 drinks per occasion

for a man); heavy drinking (> 1 drink per day on average for a woman, and > 2 drinks per day on average for a man); any alcohol consumption by youth aged < 21 years; and any alcohol consumption by pregnant women. Alcohol dependence and alcohol abuse were considered outcomes of excessive drinking and not the primary basis for assessing economic costs, as most excessive drinkers are not alcohol-dependent. However, a history of alcohol dependence was used as a specific indicator of excessive drinking in some analyses (e.g., productivity losses based on lost earnings at work).

National Study

The methodology used in the national cost study followed U.S. Public Health Service Guidelines³ and therefore focused on the direct and indirect costs of excessive alcohol consumption. Intangible costs, such as pain and suffering, were excluded. Healthcare costs, productivity losses, and costs due to other alcohol-related effects in 2006 were obtained from national databases. Alcohol-attributable fractions were obtained from multiple sources and used to assess the proportion of costs that should be attributed to excessive alcohol consumption.

Healthcare costs included the treatment costs for 54 health conditions (whether fatal or nonfatal) that were fully or partially attributable to alcohol¹, including alcohol dependence or abuse and fetal alcohol syndrome (FAS); research and prevention costs; health insurance administration costs; and the costs of training substance abuse and mental health professionals. Productivity losses included those associated with premature mortality; impaired productivity (at work, at home, and while institutionalized); work-related absenteeism; crime (lost work days among victims and lost productivity from incarcerations); and reduced productivity related to FAS. Other effects included costs associated with property damage due to crimes; criminal justice system costs, including for police protection, the court system, correctional institutions, private legal costs, and alcohol-related crimes (e.g., driving under the influence, liquor law violations, and public drunkenness); motor vehicle crashes; fire damage; and FAS-related special education. Full details on the methods used in the national study² are available at www.ajpmonline.org/article/S0749-3797%2811%2900538-1/addOns and www.lewin.com/~media/Lewin/Site_Sections/Publications/Economic%20Cost%20of%20Excessive%20Alcohol%20Consumption.pdf.

Calculation of State Total Cost Estimates

The same 26 cost components that were used to estimate national costs were also used to calculate state costs. For each of these 26 components, an allocator ([Appendix A](#), available online at www.ajpmonline.org) was selected to apportion the national cost to the states ([Appendix B](#), available online at www.ajpmonline.org). The selection of allocators was made by the expert panel. In general, allocators were selected based on their data availability; consistency with the national estimate; relationship to a particular cost; representativeness of the population affected (e.g., state share of total binge episodes among women of child-bearing age was used to allocate national costs for FAS); and scientific evidence linking an allocator to a specific cost item. Some allocators were directly related to a cost category (e.g., state budgets for fire protection services); others were based on risk measures (e.g., binge drinking episodes) or health outcomes (e.g., alcohol-attributable deaths [AADs]).

Healthcare-related allocators. Various allocators were used to derive state healthcare costs for treatment of alcohol-attributable conditions ([Appendix A](#), available online at www.ajpmonline.org). The 2006 National Survey of Substance Abuse Treatment Services (N-SSATS),¹³ provided a March 31, 2006, census of the number of patients in substance abuse treatment facilities for alcohol-related problems in each state; the state's proportion of all such patients was used to allocate costs related to such treatment. Average annual state-specific AADs for 2001–2005, available on the CDC's alcohol-related disease impact (ARDI) application,¹ were used to allocate national healthcare treatment costs related to excessive drinking (e.g., ambulatory care visits, hospitalizations). State-specific binge drinking episodes among women aged 18–44 years from the 2006 Behavioral Risk Factor Surveillance System (BRFSS; special analyses run from data at www.cdc.gov/brfss/ on August 13, 2012)¹⁴ were used to allocate costs due to FAS. No adjustment was made for state-level differences in healthcare treatment costs, because a state-level index for relative service costs was not available.

Productivity-related allocators. Because the national estimates for impaired work and household productivity losses were based on alcohol dependence, the number of people aged ≥ 12 years with alcohol dependence by state as reported in the 2005–2006 National Surveys on Drug Use and Health was used to allocate these costs to states.¹⁵ In the national estimate, premature mortality was valued as the net present value (discounted at 3%) of a lost future wage stream related to age at death. Accordingly, a state's proportion of national YPLL from deaths caused by any of the 54 alcohol-attributable conditions as reported in ARDI¹ was used as the allocator for premature mortality. The national cost of absenteeism was only assessed for binge drinking, so state-specific binge drinking episodes, as reported in the 2006 BRFSS,¹⁴ were used to apportion this cost to states. For productivity losses related to incarceration, the number of inmates in jails or prisons by state, as reported in the Bureau of Justice 2006 midyear census,¹⁶ was used to allocate costs to states.

For all productivity-related losses, a cost adjustment was also used to account for differences in average wages among states. Depending on the type of loss, one of three state wage adjustors was used: 2006 mean hourly wage for all occupations,¹⁷ 2006 mean hourly wage for child care workers¹⁷; and 2006 mean hourly minimum wage.¹⁸ An allocated state estimate was multiplied by the ratio of the relevant state wage adjustor to the national wage. These products were summed for all states and then the state's proportion of the wage-adjusted national total was used to reallocate the original national cost, effectively increasing relative productivity losses for states with a higher wage structure, and lowering it for those with a lower wage structure.

Allocators for other costs. Motor vehicle crash costs were allocated based on a state's share of the total alcohol-impaired (blood alcohol content ≥ 0.08) motor vehicle crash deaths as reported in the National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS) for 2006.¹⁹ Criminal justice system costs were allocated by a state's share of national corrections costs,²⁰ arrests for violent and property crime,²¹ or arrests for alcohol-related crimes.²² Government expenditures for fire protection services²³ were used to allocate fire costs, as fire protection constituted 74% of alcohol-attributable fire costs in the national study.²

Cost to Government

The national study² estimated that government paid \$94.2 billion (42.1%) of the total cost of excessive alcohol consumption in the U.S. in 2006. These costs were allocated to states in the same manner as total costs (see above) and should be viewed as an approximation. Federal funds are often combined with state funds to pay for alcohol-attributable expenditures (e.g., treatment costs for alcohol dependence). Therefore, no attempt was made to disaggregate federal and state governmental contributions to the cost of excessive drinking for each state. Moreover, given differences across states in policies and the share of costs paid in each category by federal versus state funds and the lack of data to accurately distinguish these relative shares, such an effort would be technically difficult, if not impossible.

Cost Per Alcoholic Drink and Cost Per Capita

The number of standard drinks per state was estimated by multiplying the number of gallons of ethanol sold²⁴ by the specific gravity of ethanol (0.79) by the weight of 1 gallon of water (8.33 pounds) and the number of grams in 1 pound (453.59) and dividing that product by the number of grams of ethanol in a standard drink (14.0).²⁵ The estimated state cost was divided by the number of standard drinks per state to arrive at the state cost per drink. The cost was also divided by the state population²⁶ to estimate per capita cost.

Cost of Binge Drinking

The national study² estimated that binge drinking was responsible for \$170.7 billion (76.4%) of the total cost of excessive alcohol consumption in the U.S. in 2006. National binge drinking costs were distributed to states in a similar manner to the total costs, with some exceptions ([Appendix A](#), online at www.ajpmonline.org). For example, healthcare-related allocations involving AADs were restricted to AADs from acute causes plus 68.5% of AADs for alcohol abuse and alcohol dependence (based on the proportion of people with these conditions who reported binge drinking in the past month in the National Epidemiologic Survey on Alcohol and Related Conditions²⁷ [NESARC]). Liquor law violations were also removed from arrest-related allocators because they may not have involved binge drinking. As in the national study, component costs that were associated with acute intoxication (e.g., motor vehicle crashes, crime costs, deaths from acute conditions, and healthcare costs from acute conditions) were 100% assigned to binge drinking.

Cost of Underage Drinking

The national study² estimated that underage drinking was responsible for \$24.6 billion (11.0%) of the total cost of excessive alcohol consumption in the U.S. in 2006. These costs were allocated to states using the same general approach that was used to allocate total costs and the costs of binge drinking ([Appendix A](#), available online at www.ajpmonline.org). To the extent possible, allocators were restricted to indicators and specific outcomes that affected youth aged < 21 years (e.g., alcohol dependents aged 12–20 years and binge drinking in those aged 12–20 years).

Table 1. Estimated total and governmental costs of excessive alcohol consumption, by state, 2006

State	Total cost (\$)			Governmental cost (\$)			
	Cost (millions)	Cost per drink	Per capita cost	Cost (millions)	Cost per drink	Per capita cost	% of total cost
Alabama	3,216.6	2.05	699	1,252.6	0.80	272	38.9
Alaska	734.5	2.34	1096	315.2	1.00	470	42.9
Arizona	5,325.6	2.07	864	2,244.2	0.87	364	42.1
Arkansas	1,871.2	2.12	666	750.4	0.85	267	40.1
California	31,856.4	2.25	874	13,675.2	0.97	375	42.9
Colorado	4,306.3	1.95	906	1,882.8	0.85	396	43.7
Connecticut	2,712.6	1.91	774	1,136.6	0.80	324	41.9
Delaware	686.8	1.40	805	299.0	0.61	350	43.5
District of Columbia	966.7	2.35	1662	403.3	0.98	694	41.7
Florida	13,341.7	1.53	738	5,635.8	0.65	312	42.2
Georgia	6,345.3	1.94	678	2,647.6	0.81	283	41.7
Hawaii	821.5	1.42	639	334.5	0.58	260	40.7
Idaho	977.4	1.57	667	401.0	0.64	273	41.0
Illinois	9,335.4	1.82	728	3,797.7	0.74	296	40.7
Indiana	4,206.7	1.94	666	1,792.2	0.82	284	42.6
Iowa	1,853.5	1.64	622	762.3	0.67	256	41.1
Kansas	1,921.5	2.09	695	799.1	0.87	289	41.6
Kentucky	2,764.8	2.06	657	1,151.7	0.86	274	41.7
Louisiana	3,403.9	1.75	794	1,367.6	0.70	319	40.2
Maine	879.9	1.51	666	372.6	0.64	282	42.3
Maryland	4,172.4	1.96	743	1,857.7	0.87	331	44.5
Massachusetts	5,112.6	1.76	794	2,173.8	0.75	338	42.5
Michigan	8,218.8	2.16	814	3,511.8	0.92	348	42.7
Minnesota	3,547.4	1.65	687	1,456.2	0.68	282	41.0
Mississippi	2,138.0	1.93	735	790.4	0.71	272	37.0
Missouri	4,464.6	1.86	764	1,797.3	0.75	308	40.3
Montana	791.2	1.73	838	300.4	0.66	318	38.0
Nebraska	1,118.4	1.57	632	476.0	0.67	269	42.6
Nevada	1,940.9	1.23	778	814.2	0.52	326	42.0
New Hampshire	852.3	0.88	648	348.3	0.36	265	40.9
New Jersey	5,937.1	1.69	680	2,530.2	0.72	290	42.6
New Mexico	1,876.1	2.36	960	793.5	1.00	406	42.3
New York	14,225.9	2.11	737	6,262.5	0.93	324	44.0
North Carolina	6,042.7	2.00	682	2,536.7	0.84	286	42.0

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Table 1. Estimated total and governmental costs of excessive alcohol consumption, by state, 2006 (continued)

State	Total cost (\$)			Governmental cost (\$)			
	Cost (millions)	Cost per drink	Per capita cost	Cost (millions)	Cost per drink	Per capita cost	% of total cost
North Dakota	419.6	1.36	660	169.7	0.55	267	40.4
Ohio	7,654.2	1.92	667	3,259.1	0.82	284	42.6
Oklahoma	2,491.2	2.67	696	1,047.2	1.12	293	42.0
Oregon	2,864.8	1.75	774	1,280.0	0.78	346	44.7
Pennsylvania	8,398.1	1.81	675	3,604.7	0.78	290	42.9
Rhode Island	827.4	1.74	775	354.9	0.75	332	42.9
South Carolina	3,274.7	1.77	758	1,269.5	0.68	294	38.8
South Dakota	542.2	1.60	693	213.5	0.63	273	39.4
Tennessee	4,165.6	2.09	690	1,683.7	0.84	279	40.4
Texas	16,524.8	1.89	703	6,718.0	0.77	286	40.7
Utah	1,473.8	2.74	578	664.0	1.23	260	45.0
Vermont	423.7	1.45	679	181.2	0.62	290	42.8
Virginia	5,354.9	1.92	701	2,261.2	0.81	296	42.2
Washington	5,319.1	2.13	832	2,374.4	0.95	371	44.6
West Virginia	1,129.8	2.01	621	452.7	0.81	249	40.1
Wisconsin	4,180.2	1.45	752	1,796.0	0.62	323	43.0
Wyoming	468.0	1.91	909	195.5	0.80	380	41.8
State median	2,864.8	1.91	703	1,252.6	0.78	293	42.0

Underage AADs were restricted for all but two causes to those aged <21 years. The state-specific estimates of underage AADs due to homicide and motor vehicle crashes were instead based on state-specific estimates of the age of the responsible person (e.g., the age of the driver in an alcohol-attributable fatal motor vehicle crash or the age of a murderer) rather than the age of the decedent,

to better reflect the number of underage AADs from underage drinking. For those allocators where data were unavailable for all underage youth, an allocator was selected that was thought to be reflective of this population (e.g., the state share of juveniles in residential placement or live births to girls aged 15-19 years; Appendix A, available online at www.ajpmonline.org).

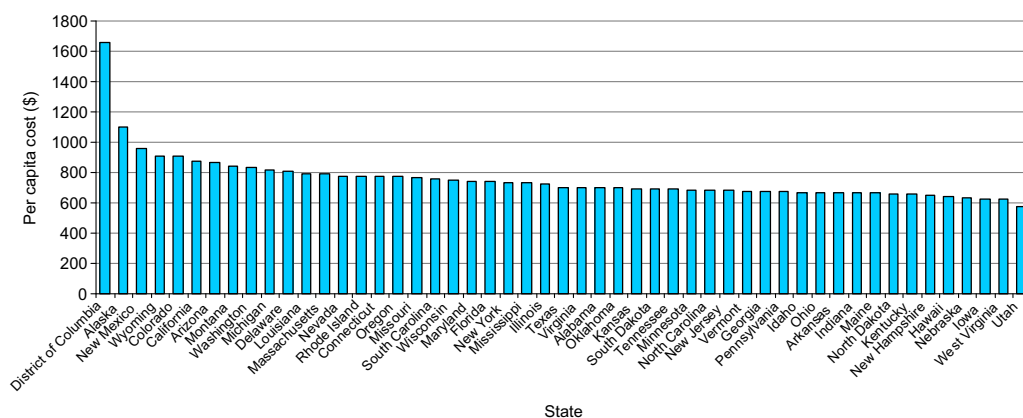


Figure 1. Ordered per capita cost of excessive alcohol consumption, by state, U.S., 2006

Results

Across all states, the median cost of excessive drinking was \$2.9 billion with the highest cost being observed in California (\$31.9 billion) and the lowest in North Dakota (\$419.6 million). To allow for comparison across states, costs were normalized for each state

Table 2. Estimated healthcare, productivity, and other costs of excessive alcohol consumption, by state, 2006

State	Healthcare		Productivity		Other ^a	
	Cost (millions \$)	% of total cost	Cost (millions \$)	% of total cost	Cost (millions \$)	% of total cost
Alabama	330.7	10.3	2,206.2	68.6	679.7	21.1
Alaska	75.8	10.3	566.2	77.1	92.5	12.6
Arizona	617.0	11.6	3,709.1	69.6	999.5	18.8
Arkansas	171.1	9.1	1,279.2	68.4	420.9	22.5
California	3,012.1	9.5	23,876.5	75.0	4,967.7	15.6
Colorado	650.4	15.1	3,075.7	71.4	580.3	13.5
Connecticut	307.2	11.3	2,053.5	75.7	351.9	13.0
Delaware	86.4	12.6	477.9	69.6	122.5	17.8
District of Columbia	83.1	8.6	794.0	82.1	89.6	9.3
Florida	1,472.6	11.0	9,352.9	70.1	2,516.1	18.9
Georgia	573.6	9.0	4,557.9	71.8	1,213.8	19.1
Hawaii	73.3	8.9	600.7	73.1	147.6	18.0
Idaho	114.1	11.7	676.3	69.2	187.0	19.1
Illinois	960.9	10.3	7,149.8	76.6	1,224.8	13.1
Indiana	571.5	13.6	2,965.7	70.5	669.5	15.9
Iowa	214.0	11.5	1,342.1	72.4	297.4	16.0
Kansas	236.4	12.3	1,374.4	71.5	310.7	16.2
Kentucky	406.9	14.7	1,904.5	68.9	453.4	16.4
Louisiana	316.0	9.3	2,323.5	68.3	764.4	22.5
Maine	133.6	15.2	614.9	69.9	131.4	14.9
Maryland	532.3	12.8	2,935.0	70.3	705.2	16.9
Massachusetts	631.2	12.3	3,902.7	76.3	578.7	11.3
Michigan	946.5	11.5	6,107.2	74.3	1,165.1	14.2
Minnesota	312.8	8.8	2,753.3	77.6	481.3	13.6
Mississippi	224.9	10.5	1,396.6	65.3	516.5	24.2
Missouri	501.4	11.2	3,157.9	70.7	805.2	18.0
Montana	92.9	11.7	529.9	67.0	168.3	21.3
Nebraska	126.0	11.3	789.3	70.6	203.1	18.2
Nevada	203.2	10.5	1,362.2	70.2	375.4	19.3
New Hampshire	89.0	10.4	640.8	75.2	122.4	14.4
New Jersey	570.9	9.6	4,517.1	76.1	849.0	14.3
New Mexico	278.8	14.9	1,283.9	68.4	313.4	16.7
New York	1,729.4	12.2	10,502.6	73.8	1,993.9	14.0
North Carolina	667.7	11.0	4,278.5	70.8	1,096.6	18.1

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Table 2. Estimated healthcare, productivity, and other costs of excessive alcohol consumption, by state, 2006 (continued)

State	Healthcare		Productivity		Other ^a	
	Cost (millions \$)	% of total cost	Cost (millions \$)	% of total cost	Cost (millions \$)	% of total cost
North Dakota	59.3	14.1	280.9	66.9	79.4	18.9
Ohio	894.4	11.7	5,536.5	72.3	1,223.3	16.0
Oklahoma	305.5	12.3	1,707.4	68.5	478.3	19.2
Oregon	430.0	15.0	1,946.4	67.9	488.4	17.0
Pennsylvania	1,005.7	12.0	5,934.0	70.7	1,458.4	17.4
Rhode Island	110.6	13.4	606.1	73.3	110.7	13.4
South Carolina	345.9	10.6	2,191.7	66.9	737.2	22.5
South Dakota	69.3	12.8	355.0	65.5	117.9	21.7
Tennessee	432.4	10.4	2,865.2	68.8	868.0	20.8
Texas	1,295.2	7.8	11,901.8	72.0	3,327.8	20.1
Utah	187.4	12.7	1,048.7	71.2	237.8	16.1
Vermont	67.3	15.9	291.9	68.9	64.4	15.2
Virginia	528.9	9.9	3,938.4	73.5	887.5	16.6
Washington	809.3	15.2	3,715.5	69.9	794.3	14.9
West Virginia	134.0	11.9	787.0	69.7	208.8	18.5
Wisconsin	507.9	12.2	2,836.3	67.9	836.0	20.0
Wyoming	59.0	12.6	285.1	60.9	123.9	26.5
State median	316.0	11.6	2,053.5	70.5	488.4	17.0

^aOther includes costs associated with property damage due to crimes; criminal justice system costs, including costs for police protection, the court system, correctional institutions, private legal costs, and alcohol crimes (e.g., driving under the influence, liquor law violations, and public drunkenness); motor vehicle crashes; property damage from fire; and special education related to fetal alcohol syndrome.

by population and by number of drinks consumed. When costs were normalized by population, the median cost was \$703 per person annually. The District of Columbia's per capita cost (\$1662) was the highest and was more than double the median. Alaska had the second-highest per capita cost (\$1096). Utah, at \$578, had the lowest per capita cost and was the only state to have costs below \$600 per capita. Thirty-nine states had per capita costs between \$600 and \$800, and 25 states were clustered around the median with costs between \$650 and \$750 per capita (Table 1; Figure 1).

When costs were normalized by the number of drinks consumed, the median cost per drink was \$1.91. Utah (\$2.74) and Oklahoma (\$2.67 per drink) were the only two states with a cost per drink that was > 25% above the median. In contrast, five states (Delaware, Hawaii, Nevada, New Hampshire, and North Dakota) had a cost per drink that was > 25% less than the median. The cost per drink in New Hampshire (\$0.88) was less than half the median (Table 1).

Across all states, the median cost to government was \$1.3 billion (range: \$13.7 billion [California] to \$169.7 million [North Dakota]). A median of 42% of the total state cost was paid by government with a range of 45% in Utah to 37% in Mississippi. For the median state, excessive drinking cost the government \$0.78 per drink (Table 1).

Productivity losses represented the largest share (median 70.5%) of total state costs of excessive drinking. Healthcare costs represented 11.6%, and other costs such as alcohol-related criminal justice system costs, motor vehicle crash, and crime-related property damage represented 17.0%. The share of costs represented by each cost category varied substantially across the states. The share represented by productivity losses ranged from 60.9% in Wyoming to 82.1% in DC. The median proportion of costs for health care ranged from 15.9% in Vermont to 7.8% in Texas (Table 2).

Across all states, the median cost of binge drinking was \$2.2 billion (range: \$23.5 billion [California] to \$305.3 million [North Dakota]). Binge drinking was responsible

Table 3. Estimated costs for binge drinking and underage drinking, by state, 2006

State	Binge drinking (all ages)		Underage drinking	
	Cost (millions \$)	% of total cost	Cost (millions \$)	% of total cost
Alabama	2,595.4	80.7	408.5	12.7
Alaska	545.0	74.2	108.1	14.7
Arizona	4,118.6	77.3	533.2	10.0
Arkansas	1,520.9	81.3	205.8	11.0
California	23,540.5	73.9	3470.8	10.9
Colorado	3,225.2	74.9	531.5	12.3
Connecticut	2,030.6	74.9	219.7	8.1
Delaware	525.0	76.4	71.6	10.4
District of Columbia	745.8	77.1	53.6	5.5
Florida	10,261.3	76.9	1618.3	12.1
Georgia	5,063.8	79.8	653.9	10.3
Hawaii	632.9	77.0	95.3	11.6
Idaho	748.9	76.6	135.9	13.9
Illinois	7,130.3	76.4	936.8	10.0
Indiana	3,228.7	76.8	556.4	13.2
Iowa	1,386.0	74.8	255.5	13.8
Kansas	1,492.1	77.7	256.4	13.3
Kentucky	2,208.6	79.9	316.4	11.4
Louisiana	2,827.3	83.1	361.4	10.6
Maine	653.2	74.2	120.6	13.7
Maryland	3,223.8	77.3	470.4	11.3
Massachusetts	3,658.9	71.6	406.4	7.9
Michigan	6,096.0	74.2	830.2	10.1
Minnesota	2,644.4	74.5	446.4	12.6
Mississippi	1,773.9	83.0	207.9	9.7
Missouri	3,522.9	78.9	505.6	11.3
Montana	609.2	77.0	87.8	11.1
Nebraska	844.7	75.5	207.2	18.5
Nevada	1,481.5	76.3	203.4	10.5
New Hampshire	625.7	73.4	93.1	10.9
New Jersey	4,420.9	74.5	543.8	9.2
New Mexico	1,423.2	75.9	158.6	8.5
New York	10,596.3	74.5	1183.6	8.3
North Carolina	4,774.7	79.0	566.1	9.4

(continued on next page)

for a median of 76.6% of state costs (range: 83.1% [Louisiana] to 71.6% [Massachusetts]; [Table 3](#)). Across all states, underage drinking was responsible for a median of \$361.4 million in economic costs (range: \$3.5 billion [California] to \$53.6 million [District of Columbia]). The median proportion of total state costs due to underage drinking was 11.2% but varied widely (range: 20.0% [Wyoming] to 5.5% [District of Columbia]; [Table 3](#)).

In order to assess the relative magnitude of the total state costs for excessive drinking, these costs were compared to the total state costs for smoking and the total state cost of Medicaid (including federal and state contributions). Although derived using different methods, the total state costs for excessive drinking were generally of the same order of magnitude as the total cost of smoking to states in 2004, and in many states, the total state cost of Medicaid in 2006 as well ([Table 4](#)). The total state costs of smoking ranged from \$17.7 billion in California to \$291 million in Wyoming, and the total state cost of Medicaid ranged from \$44.7 billion in New York to \$421 million in Wyoming.

Discussion

In 2006, excessive alcohol use cost states a median of \$2.9 billion (\$703 per person or about \$1.91 per drink). More than 70% of these costs were due to binge drinking, and about \$2 of every \$5 of these costs were paid by government. Several states have independently estimated the economic cost of excessive alcohol consumption.^{5–12} It is difficult to compare the state cost estimates

Table 3. Estimated costs for binge drinking and underage drinking, by state, 2006 (continued)

State	Binge drinking (all ages)		Underage drinking	
	Cost (millions \$)	% of total cost	Cost (millions \$)	% of total cost
North Dakota	305.3	72.7	69.4	16.5
Ohio	5,777.8	75.5	880.3	11.5
Oklahoma	1,966.7	78.9	279.4	11.2
Oregon	2,097.6	73.2	386.1	13.5
Pennsylvania	6,443.1	76.7	968.7	11.5
Rhode Island	594.4	71.8	73.7	8.9
South Carolina	2,587.6	79.0	367.2	11.2
South Dakota	412.8	76.1	107.3	19.8
Tennessee	3,336.8	80.1	489.8	11.8
Texas	12,989.2	78.6	1846.9	11.2
Utah	1,141.1	77.4	260.2	17.7
Vermont	315.6	74.5	54.7	12.9
Virginia	4,161.5	77.7	572.8	10.7
Washington	3,960.2	74.5	575.8	10.8
West Virginia	883.8	78.2	122.7	10.9
Wisconsin	3,178.6	76.0	601.1	14.4
Wyoming	371.5	79.4	93.5	20.0
State median	2,208.6	76.6	361.4	11.2

in this report to those estimates because of differences in the overall analytic framework used, inconsistencies in the definition of excessive alcohol use, different sources of cost information, and the time periods assessed. However, estimates in the current study were quite similar to two individual state cost estimates that were for the same year—New Mexico estimated the 2006 economic cost of excessive drinking at \$2.5 billion⁹ (vs \$1.9 billion in the current study); and Oregon estimated the cost at \$3.2 billion¹⁰ (vs \$2.9 billion in the current study).

The state estimates calculated here are most likely substantial underestimates, as they were based on apportioning a national estimate that was also underestimated.² For example, no matter how divided up among the states, the national estimate for reductions in workplace or household productivity did not include women, for technical reasons.² Moreover, they were based on only the impact of alcohol dependence on productivity, and with the exception of a portion of absenteeism, omitted the likely impact of excessive alcohol consumption by nondependent drinkers (binge and heavy drinking) on other forms of lost workplace

productivity (e.g., presenteeism, such as attending work while “hung over”).

The mortality, morbidity, and associated lost productivity estimates were based on only the primary cause of death or illness and did not include contributing causes that were related to alcohol. Neither the national study nor these state estimates included intangible costs like pain, suffering, and bereavement. A study of the costs of underage drinking estimated that 67% of the total economic impact was due to intangible costs.²⁸ Should a similar relationship apply here, the costs of excessive alcohol consumption for states would have been at least two times higher. Multiple additional sources of underestimation for the national costs that were apportioned to states are described in Table 3 of the national report.²

Observed interstate differences in the costs of excessive alcohol consumption were influenced by a number of factors, some of which were likely independent of differ-

ences in alcohol consumption (e.g., road design and access to emergency medical services). However, differences in cost per drink and cost per capita do reflect differences in individual alcohol consumption (a proxy for excessive alcohol use), which is influenced by social and cultural factors such as varying demographics,²⁹ religiosity,³⁰ urbanicity,³¹ accepted drinking norms,³² and other issues.³³ Excessive alcohol consumption is also influenced by alcohol control policies related to the availability and accessibility of alcohol (and their enforcement); alcohol advertising; alcohol excise taxes; and drinking and driving.^{34,35}

Strengths and Limitations

There are a number of advantages to assessing the cost of excessive alcohol consumption in states based on national costs. First, this approach overcame a data limitation in that it supported estimation of alcohol-attributable costs for items where data were only available at the national level (e.g., productivity losses at work), but where the costs themselves were actually incurred at the state and local levels. Second, by using a

Table 4. Costs of excessive drinking, smoking, and Medicaid, by state (millions \$)

State	Excessive drinking 2006	Smoking 2004 ^a	Medicaid 2006 ^b
Alabama	3,217	3,550	3,886
Alaska	735	326	960
Arizona	5,326	2,779	6,196
Arkansas	1,871	2,118	2,895
California	31,856	17,727	34,247
Colorado	4,306	2,306	2,873
Connecticut	2,713	2,648	4,213
Delaware	687	588	947
District of Columbia	967	476	1,302
Florida	13,342	12,799	12,763
Georgia	6,345	5,334	6,841
Hawaii	822	644	1,101
Idaho	977	652	1,044
Illinois	9,335	8,398	10,119
Indiana	4,207	4,579	5,674
Iowa	1,854	1,980	2,615
Kansas	1,922	1,790	2,078
Kentucky	2,765	3,638	4,378
Louisiana	3,404	3,393	4,861
Maine	880	1,096	1,954
Maryland	4,172	3,747	5,000
Massachusetts	5,113	5,466	9,697
Michigan	8,219	7,203	8,288
Minnesota	3,547	3,268	5,666
Mississippi	2,138	2,132	3,270
Missouri	4,465	4,554	6,477
Montana	791	572	726
Nebraska	1,118	1,036	1,537
Nevada	1,941	1,397	1,178
New Hampshire	852	969	1,107
New Jersey	5,937	5,802	9,084
New Mexico	1,876	928	2,490
New York	14,226	14,189	44,712
North Carolina	6,043	5,770	9,140
North Dakota	420	437	504
Ohio	7,654	9,033	12,251

(continued on next page)

standard approach to assess costs, this methodology allowed for cost comparisons between states and ensures that national and state totals align. Third, this methodology was more cost-efficient and timely than assessing costs in each state or local area, and provides a starting point for more-detailed cost assessments, which state or local health agencies may wish to conduct in the future.

Assessing the economic cost of excessive alcohol consumption in states based on national costs has limitations. First, as previously noted, national cost estimates substantially underestimate the actual cost of excessive alcohol use for a variety of reasons.² Second, although state cost allocators (e.g., alcohol-attributable health outcomes) were carefully selected to reflect the expected distribution of state costs for a particular cost component (e.g., alcohol-attributable hospitalizations), it is likely that some of these allocators did not fully capture factors that might have influenced the state distribution of some national costs.

Third, some cost allocators (e.g., the state share of alcohol-attributable deaths) are likely to vary from year to year, affecting the stability of state cost estimates for various subgroups such as underage youth, particularly in smaller states. Fourth, some alcohol-attributable costs (e.g., criminal justice costs for police protection and legal adjudication) were affected by other factors, such as the availability of state resources to enforce laws against alcohol-attributable crimes (e.g., driving while impaired). As a result, differences in these costs across states may not accurately reflect true differences in the occurrence of alcohol-attributable

Table 4. Costs of excessive drinking, smoking, and Medicaid, by state (millions \$) (continued)

State	Excessive drinking 2006	Smoking 2004 ^a	Medicaid 2006 ^b
Oklahoma	2,491	2,718	2,973
Oregon	2,865	2,193	2,941
Pennsylvania	8,398	9,830	15,512
Rhode Island	827	870	1,697
South Carolina	3,275	2,930	4,069
South Dakota	542	502	607
Tennessee	4,166	4,906	6,066
Texas	16,525	12,276	18,116
Utah	1,474	618	1,473
Vermont	424	430	948
Virginia	5,355	4,514	4,654
Washington	5,319	3,700	5,579
West Virginia	1,130	1,683	2,099
Wisconsin	4,180	3,666	4,653
Wyoming	468	291	421
State median	2,865	2,718	3,886
U.S.-Total	223,479	194,451	303,882

^aFrom www.cdc.gov/tobacco/data_statistics/state_data/data_highlights/2006/pdfs/dataHighlights06rev.pdf. These costs are not directly comparable to the costs of excessive drinking because of a different base year, methods used to estimate the cost, and components included in the analyses.

^bFrom Table 1 at www.kff.org/medicaid/upload/7334-03.pdf; includes federal contribution to state for Medicaid

outcomes. Fifth, costs for alcohol regulatory structures were not included. Sixth, although productivity-related losses were adjusted to account for differences in state wages, state adjustment factors were not available for many cost items (e.g., differences in the cost of repairing a motor vehicle that was damaged in an alcohol-attributable crash), resulting in some imprecision in the allocation of these costs to states. The wage adjustments used in this study also resulted in a lost life being valued differently in different states even after taking into account differences in the demographic characteristics of the decedent (i.e., age and gender). Seventh, state estimates of the per-drink cost of excessive alcohol consumption were based on the total gallons of ethanol sold in a state. As a result, it reflects both state sales of alcohol and state drinking levels. Although per capita alcohol sales in states generally correlate strongly with self-reported alcohol consumption in states,³⁶ a substantial proportion of the alcohol sales in some states, such as New Hampshire and Nevada, are to nonresidents, resulting in a substantial underestimate of the actual state

cost for excessive alcohol consumption on a per-drink basis.

Based on the ratio of self-reported consumption to alcohol sales in 2006,³⁶ had alcohol sales in New Hampshire and Nevada been restricted to state residents, the estimated cost per drink would likely have been 112% and 54% higher, respectively, than reported here (unpublished analysis, 2012). Finally, there are many differences across states, such as demographics, economic conditions, and governmental policy, that were not accounted for in the methods of this study. Accordingly, some states may wish to generate their own estimates of the costs of excessive alcohol consumption using state-specific data sources to increase the precision of these estimates. These cost estimates will be updated as more current data become available.

Conclusion

Excessive alcohol consumption has a substantial, but largely under-recognized, economic impact on all states in the U.S. The *Community Guide*⁴ has recom-

mended several evidence-based strategies—including increasing alcohol excise taxes, limiting alcohol outlet density, and commercial host (dram shop) liability—that can help reduce excessive alcohol use and the associated economic costs.

The authors acknowledge the assistance of Marissa Esser, MPH, Dafna Kanny, PhD, Yong Liu, MD, MS, and Jessica Mesnick, MPH, all from the Alcohol Program, National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP), CDC; and of Mandy Stahre, PhD, MPH, EIS Officer, CDC.

This project was supported by Contracts 200-2012-M-51945 and 200-2011-M-41451 from the CDC to the CDC Foundation.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official views of the CDC.

JJS conducted this work while an employee of Sue Binder Consulting, Inc., and received funding for this project from the CDC Foundation. Jim Roeber conducted this work while an employee of the New Mexico Department of Health. Ellen

Bouchery conducted this work while an employee of Mathematica, Inc., and received funding for this project from the CDC Foundation. Katherine Gonzales conducted this work while an employee of the Michigan Department of Community Health. Frank Chaloupka conducted this work while an employee of University of Illinois at Chicago. Robert Brewer conducted this work while an employee of the CDC.

No financial disclosures were reported by the authors of this paper.

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Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version at, <http://dx.doi.org/10.1016/j.amepre.2013.06.004>.