



The Economic Cost of  
**Alcohol Abuse**  
in Montana

By **Patrick M. Barkey**  
Director

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Bureau of Business and Economic Research  
The University of Montana- Missoula  
Missoula, MT 59801  
(406) 243-5113  
[www.bber.umt.edu](http://www.bber.umt.edu)

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**BUSINESS**  
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## *Introduction and Acknowledgements*

This report is the first of its kind in attempting to quantify the relationship between drinking behavior and monetary cost in the state of Montana. The information it provides must be understood in the context of the efforts underway to direct the scarce resources available to reduce substance abuse overall in ways that produce the largest benefit. The benefits in addressing alcohol abuse are substantial, and should receive commensurate public attention.

## *Acknowledgements*

We would like to acknowledge:

- MHA, An Association of Montana Health Care Providers, for making its CompData database available for the study of alcohol-related medical care costs;
- The members of the Montana Epidemiological Work Group, formed as part of the Strategic Prevention Framework State Incentive Grant, for supporting this research, providing data, as well as invaluable encouragement and advice;
- Renaud Bengadi Kiki for research assistance throughout the project.

## The Economic Cost of Alcohol Abuse in Montana

### 0. Executive Summary

Alcohol is a product that many of us in Montana clearly enjoy. In 2005, we collectively consumed 124.7 million shots of distilled spirits, 33.0 million glasses of wine and 279.6 million 12 oz. cans of beer statewide (NIAAA, 2008). On a per capita basis, Montana ranks in the top half of states in alcohol consumption, with the 2003 consumption of 435 beers per adult -- higher than all but four other states nationwide. Like most states, buying and selling alcoholic drinks is a big business in Montana, employing thousands in production, processing, marketing, distribution and retailing.

Yet alcohol is not an ordinary good. Its consumption is causally linked to outcomes that none of us enjoy. These include outcomes that affect the drinker – ranging from alcohol-induced illness and premature death, highway crashes due to alcohol impairment, and even the impact of heavy drinking on one’s ability to earn a living – as well as those affected by a drinker’s alcohol-induced behavior. Because of the unwanted impacts of alcohol abuse, society pays a substantial price. And because alcohol use – and alcohol abuse -- is higher than average in our state, that price is larger than it has to be.

We find that the abuse of alcohol in Montana levies a cost in terms of dollars spent by businesses, individuals and governments – as well as dollars lost to the economy because of outcomes due to alcohol – of more than half a billion dollars. These costs occur due to:

- the money spent on alcohol-treatment centers around the state, supporting detoxification services, inpatient and outpatient treatment, and long- and short-term residential services: \$10.7 million;
- the money spent on medical care in hospitals and clinics, treating conditions either due to alcohol abuse or complicated by alcohol abuse: \$100.3 million;
- the cost to the economy caused by the loss of life – removing productive workers from the economy, often at a young age in the prime of their working lives,: \$296.8 million;
- the price paid by businesses, governments and families for the impairing impacts of alcohol and alcoholism on worker productivity, from higher tardiness and absenteeism, lower productivity while on the job, more sick days, a shorter, more restricted working career: \$53.3 million;
- the cost paid due to alcohol’s impact on crime and criminal behavior – the extra police, judges and prison cells needed to protect citizens and enforce the laws that are broken because of the impairing impacts of alcohol: \$49.1 million.

It is important to note that alcohol abuse is not a one-time cost to the Montana economy; it is an amount paid every single year. Moreover it is an economic cost that represents resources that could be freed for other productive uses.

## The Economic Cost of Alcohol Abuse in Montana

### 1. Introduction and Overview

Alcohol is a product that many of us in Montana clearly enjoy. In 2005, we collectively consumed 124.7 million shots of distilled spirits, 33.0 million glasses of wine and 279.6 million 12 oz. cans of beer statewide (NIAAA, 2008). On a per capita basis, Montana ranks in the top half of states in alcohol consumption, with the 2003 consumption of 435 beers per adult -- higher than all but four other states nationwide. Like most states, buying and selling alcoholic drinks is a big business in Montana, employing thousands in production, processing, marketing, distribution and retailing.

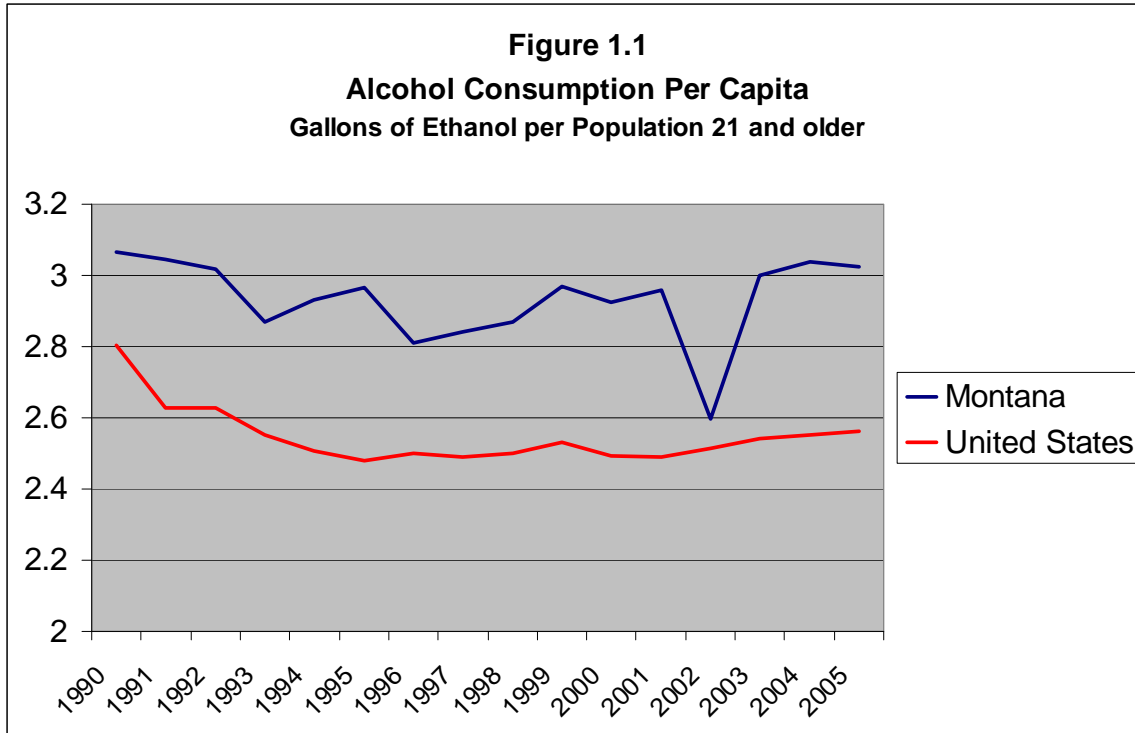
Yet alcohol is not an ordinary good. Its consumption is causally linked to outcomes that none of us enjoy. These include outcomes that affect the drinker -- ranging from alcohol-induced illness and premature death, highway crashes due to alcohol impairment, and even the impact of heavy drinking on one's ability to earn a living -- as well as those affected by a drinker's alcohol-induced behavior. This second category of outcomes is surprisingly broad.

This study attempts to quantify the cost to Montana's economy of these unwanted and undesirable consequences of alcohol consumption. Many, but not all, of these costs are paid out directly by individuals, businesses and governments. These include costs paid to support treatment centers that perform detoxification services, those dollars spent imprisoning criminals whose crimes can be attributed to alcohol abuse, and the money spent on medical treatment for alcohol-related injuries and medical conditions. But many of these costs represent opportunities for gain that are foregone due to alcohol. These range from the cost businesses bear when their workers show up late or hungover from drinking, to the tragic loss when alcohol results in death and the future of a productive life that would otherwise have occurred.

This study takes an economy-wide perspective. We ask the question, what resources would be available to the economy -- that could be used on other priorities -- if there were no abuse of alcohol? In addressing this question, we accomplish the following two goals simultaneously.

First, the dollar estimate itself gives some perspective on the magnitude of the problem, particularly in comparison to other issues and problems that compete for our attention. Alcohol is a familiar product that has acquired a social acceptance in Montana and elsewhere, and that may cause us to overlook its negative consequences. By quantifying the costs of those consequences, we can put them in a more even perspective.

But there is a second aim of this study that goes beyond these numerical estimates. That is unfolding the complex relationship between alcohol abuse and economic welfare. The myriad of mechanisms through which the deleterious effects of alcohol show up in the



bottom lines of businesses, governments, taxpayers and families is worthy of note.

The purpose of this study is to develop and present information on how alcohol abuse impacts the collective economic welfare of Montanans. By design, we focus on the undesirable side effects of excessive alcohol consumption – and, specifically, how those side effects translate into economic loss. There are clearly benefits to alcohol enjoyed by those who consume it, as well as those who earn their livelihoods producing, transporting, storing and selling it – just as there are for any other good or service produced in the economy.

We focus on economic loss because it provides a means of placing the problem of alcohol abuse into perspective with other priorities that compete for our attention and resources. Yet it is easily recognized that no dollar figure can be said to balance the loss felt by families and loved ones when lives are impacted by alcohol abuse. Thus even the most comprehensive economic assessment can only be one part of our overall assessment of the problem.

#### *Alcohol: Montana's Drug of Choice*

By almost any measure, Montanans consume alcohol at a rate that is above the national average. For certain types of drinking behaviors, Montana ranks among the highest in the nation.

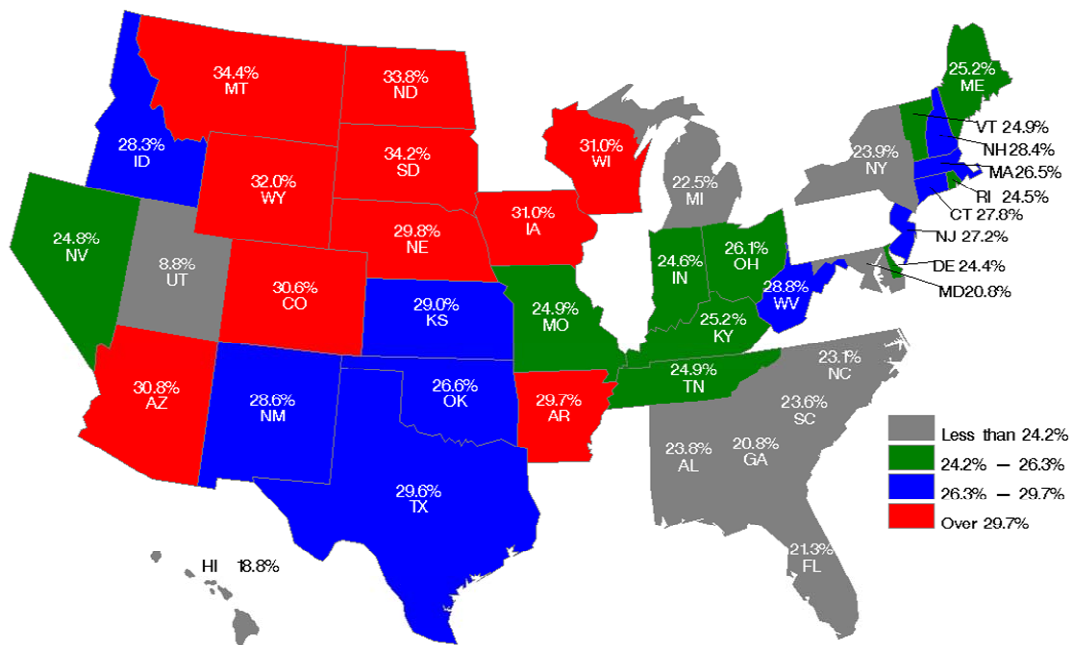
Overall consumption of alcohol per person of drinking age in Montana has historically been 15 to 20 percent higher than the national average, as shown in Figure 1.1. When beer, wine and spirits consumption are converted to their ethanol alcohol equivalents, the

data show that Montanans consumed just over 3 gallons of ethanol per person 21 years and older in 2005, almost 18 percent more than the comparative national figure.

Montana also has a relatively high incidence of underage drinking. According to the Center for Disease Control’s Youth Risk Behavior Surveillance Survey (YRBS), in 2005 more than a third of high school students in Montana experienced a binge drinking episode – consuming five or more drinks within a couple of hours – within the last 30 days. As can be seen from Figure 1.2, this was a higher percentage than any other state in the country.

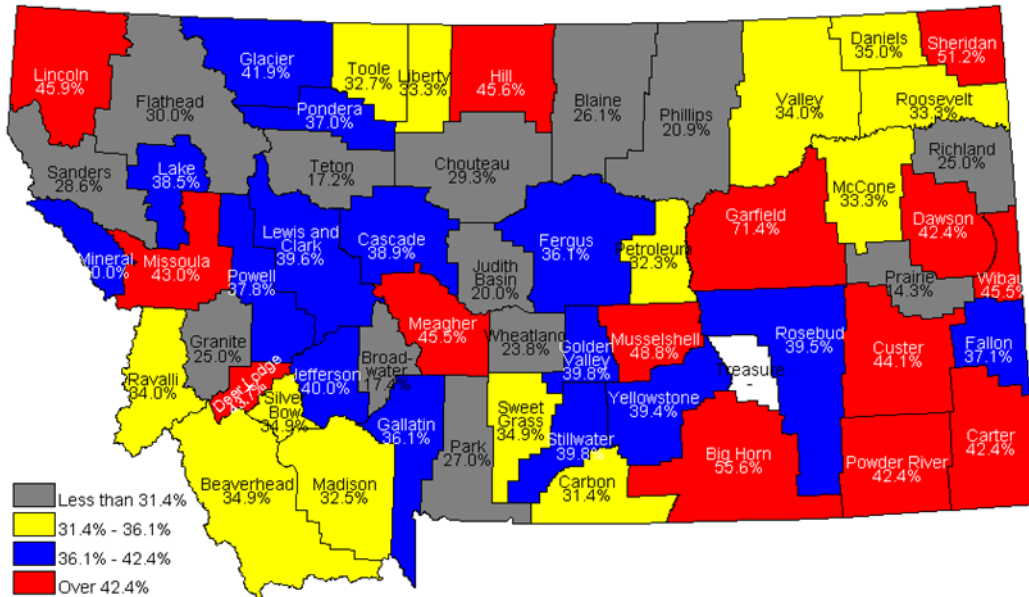
The data for individual counties and communities are even more disturbing. Some individual counties in Montana reported that more than half of high school seniors had experienced a binge drinking episode in the last two weeks in 2006, as shown in Figure 1.3.

**Figure 1.2**  
**Youth Binge Drinking Percentage by State, 2005**



Source: Youth Risk Behavior Surveillance (YRBS), 2005  
Note: Not all states participated in YRBS.

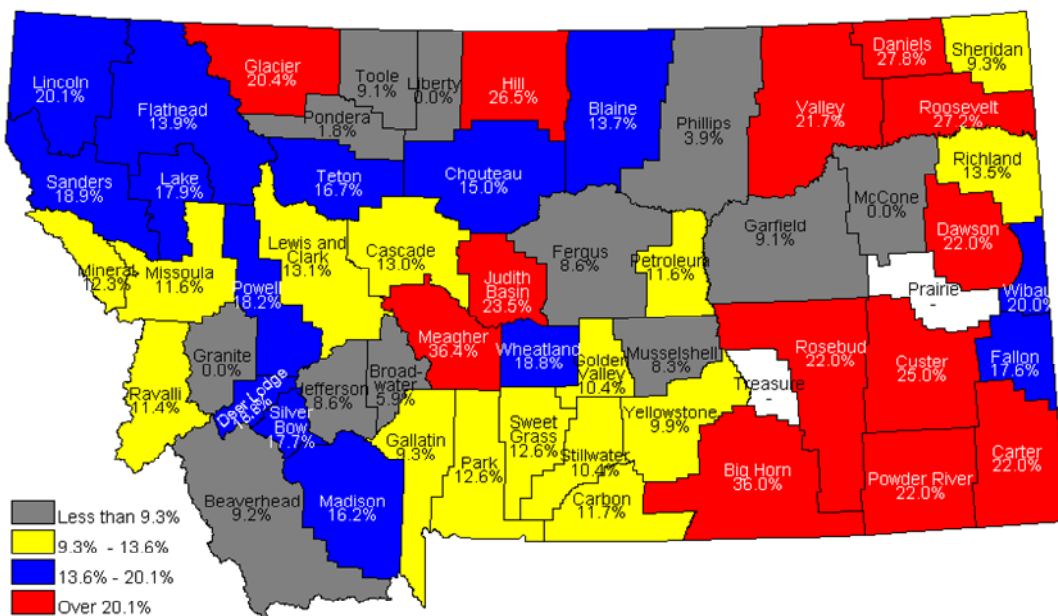
**Figure 1.3**  
**Binge Drinking by County, 12<sup>th</sup> Grade, Last Two weeks, 2006**



Source: Youth Risk Behavior Surveillance, 2006.

And

**Figure 1.4**  
**Binge Drinking by County by 8<sup>th</sup> Graders, Last Two Weeks, 2006**



Source: Youth Risk Behavior Surveillance, 2006.

there were 13 counties in Montana where the incidence of binge drinking among eighth grade students was above 20 percent (Figure 1.4).

These kinds of rankings provide additional motivation for this study. Since Montana's use of alcohol is high, it stands to reason that the cost imposed on our economic welfare is high as well. We now turn to a discussion of how to measure that cost.

### *Assessment of Economic Costs*

This study presents a conventional view of economic costs. In this study we:

- consider only the undesirable side effects of the behavior;

Like any other good or service, the cost consumers pay to acquire alcohol is presumably offset by the benefits they get from consuming it. It is the cost of treating the unwanted side effects – the illness, the injuries, and the loss in productivity – that is measured here.

- take the point of view of the entire economy;

Some costs are borne by the drinker, others by those directly affected by their behavior, and still others by the general taxpayer. Taking care to avoid double counting, we sum all of these costs, regardless of who bears them.

- tally both actual dollar outlays and imputed costs;

Dollars expended for such things as alcohol-treatment programs, law enforcement, and medical costs are added together with costs that must be imputed, such as lost economic output due to premature death or disability.

- assume no offsetting behavior;

The implicit assumption of this study is that a reduction in alcohol abuse will result in a decline in its associated costs. This, in turn, assumes that other risk behaviors (e.g., illegal drug use) are not substituted for alcohol if the use of the latter were to decline.

This is a static analysis. It does not consider how different actors in the economy might react to changes in alcohol consumption, and how, in turn, those reactions would affect the size of the economic pie. For instance, if higher alcohol-related fatalities make Montana a less desirable place to live or visit, or its higher alcohol-induced illnesses and tardiness makes the state a less desirable place to invest and do business, then it stands to reason that reductions in alcohol abuse might spur more in-migration or business investment. We have made no attempt to capture these kinds of effects in this report.



We also have made no attempt to estimate the fiscal impacts of alcohol abuse on state and local governments, although such a sub-study would doubtless be illuminating. We tally up the total costs to all actors in the economy, public and private.

*Organization of this Report*

This report presents a separate analysis for alcohol-induced costs in five areas:

- costs of alcohol treatment centers;
- costs of medical care;
- costs due to premature mortality;
- morbidity costs due to alcohol;
- alcohol related costs for crime and the criminal justice system.

These represent five different areas where data are available to construct an estimate of costs for the state. They do not exhaust all of the ways in which alcohol abuse impacts our economic welfare. We mention some of the areas that this report does not address in the final section, along with a summary and presentation of total costs.

## 2. Alcohol Treatment

In 2005, there were a total of 46 publicly- and privately-owned facilities providing substance abuse treatment in Montana that responded to the National Survey of Substance Abuse Treatment Services (N-SSATS) conducted by the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA). As shown in Table 2.1, 57 percent of these are privately-owned nonprofit facilities. At the time the survey was conducted, there were 3,048 patients receiving treatment, of whom 2,692 (88 percent) were being treated either solely or partially for substance abuse. Almost three out of every four patients was seen at a private nonprofit facility.

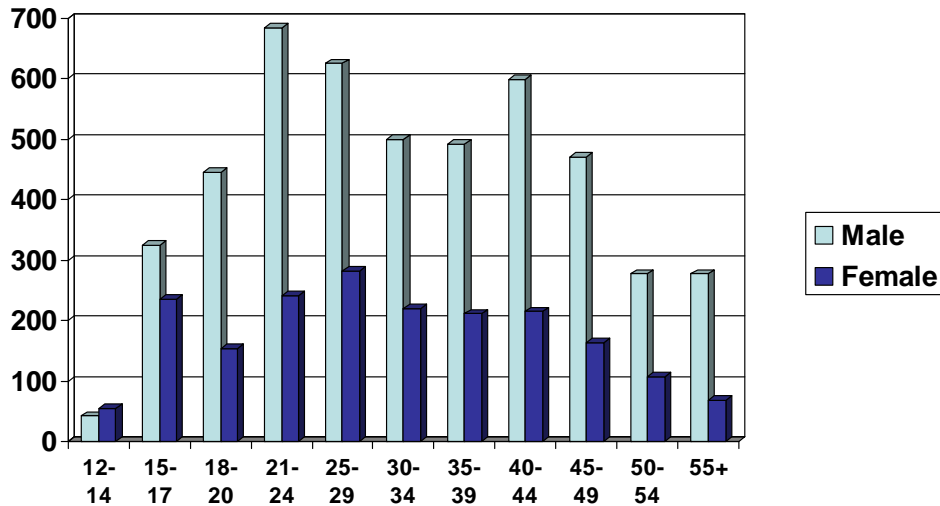
Table 2.1  
Montana Substance Abuse Treatment Facilities, 2005

Facility Ownership/Operation	<u>Facilities</u>		<u>Clients on March 31</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
Private nonprofit	26	57%	2,244	74%
Private for-profit	3	7%	54	2%
Local government	3	7%	272	9%
State government	2	4%	49	2%
Federal government	8	17%	226	7%
Dept. of Veterans Affairs	5	11%	139	5%
Dept. of Defense				
Indian Health Service	3	7%	87	3%
Other				
Tribal government	4	9%	203	7%
<b>Total</b>	<b>46</b>	<b>100%</b>	<b>3,048</b>	<b>100%</b>

Table 2.2  
Alcohol-Related Admissions to Montana Treatment Facilities, 2005

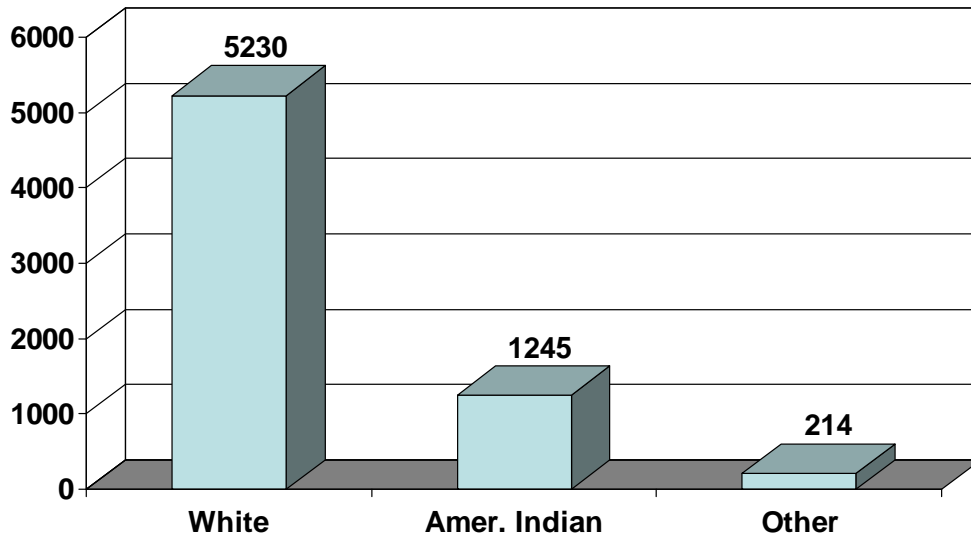
<u>Service</u>	<u>Admissions</u>		
	<u>Alcohol</u>	<u>Alcohol Only</u>	<u>Alcohol and Drug</u>
Detox, 24 Hour, Hospital Inpatient	230	133	97
Detox, 24 Hour, Free-standing Residential	1,036	307	729
Rehab/Res, Long term (> 30 days)	117	24	93
Ambulatory, Intensive Outpatient	933	289	644
Ambulatory, Non-intensive Outpatient	4,034	1,434	2,600
Ambulatory, Detoxification	339	212	127
<b>Total</b>	<b>6,689</b>	<b>2,399</b>	<b>4,290</b>

Figure 2.1  
Alcohol-Related Treatment Admission by Age  
Montana, 2005



Admissions to these facilities over the entire year are reported to SAMHSA as part of its Treatment Episode Data Set (TEDS) project. In 2005, there were 6,689 admissions for abuse of alcohol, exclusively as well as in combination with one or more drugs, as shown in Table 2.2. Patients are predominantly male – more than 70 percent of those admitted for treatment in 2005 were men. Younger and middle-aged men are particularly over-represented, with men aged 21-49 years of age accounting for half of the overall patient base, as shown in Figure 2.1.

Figure 2.2  
Alcohol-Related Treatment Admissions by Race  
Montana, 2005



American Indians are also more likely to receive treatment in substance abuse treatment facilities than their presence in the overall population of Montana would suggest. As shown in Figure 2.2, 1,245, or 18.6 percent of admissions in 2005 were American Indians, almost three times the size of their 6.3 percent share of total state population.

To estimate the cost of treatment, we must first decide on how visits to treatment centers would change if there were no alcohol abuse. Clearly the costs of treating those who come to treatment centers diagnosed with alcohol dependence only can be considered. However, as shown in Table 2.2, more than 4,000 admissions in 2005 had both alcohol and drug dependence noted. With no basis to make a more informed decision, we have attributed half of the treatment costs of those with simultaneous alcohol and drug addiction to the category of alcohol-related costs.

Table 2.3  
Alcohol-Related Costs at Montana Treatment Facilities, 2005

<u>Service</u>	<u>Alcohol Related Admissions</u>	<u>Cost per Admission</u>	<u>Total Cost (\$ million)</u>
Detox, 24 hr, Hosp. inpatient	182	2,828	0.51
Detox, 24 hr, Free-standing Res.	672	2,828	1.90
Rehab/Res, Long term (> 30 days)	71	4,292	0.30
Ambulatory, Intensive outpatient	611	4,561	2.79
Ambulatory, Non-intensive outpatient	2734	1,602	4.38
Ambulatory, Detoxification	276	2,828	0.78
<b>Total</b>	<b>4,546</b>		<b>10.67</b>

SAMHSA has reported on average treatment costs nationally (2004), including personnel, materials, administrative, equipment and depreciation costs. In some cases, such as hospital inpatient services, residential rehabilitation and outpatient services, those cost estimates are directly applicable to the services reported in TEDS. In the case of ambulatory detoxification services and detoxification at free-standing residential facilities, no information was available, so we have assumed those costs to be the same as when services are performed at hospitals. Finally, we have assumed that intensive outpatient services are one standard deviation above average costs per admission as reported by SAMHSA. All costs are adjusted to 2005 dollars using the price deflator for personal expenditures on medical care.

As summarized in Table 2.3, applying these cost estimates to treatment frequencies in Montana in 2005 yields total spending on substance abuse treatment due to alcohol abuse of \$10.7 million. Since this spending would not take place in the absence of alcohol abuse, it is carried forward as part of the cost of drinking behaviors to the Montana economy.

### 3. Medical Care

The cost of providing specialized medical care for ailments that result from alcohol use in Montana is significant. We estimate that in 2005, the costs born by individuals, governments, hospitals and other health payers statewide was \$100.7 million. These include the hospital costs, both inpatient and outpatient/emergency room care, physicians charges, prescription drug costs and the costs of nursing home care.

#### *Hospital Charges*

There are several linkages between the abuse of alcohol and the onset of medical conditions requiring specialized treatment. Some conditions requiring hospitalization or other treatment, such as alcohol poisoning and fetal alcohol syndrome, are due solely to alcohol abuse. A wider range of conditions, from accidents, to pneumonia to diabetes, are partially attributable to alcohol use. Following the “illness specific” approach used by national (NIDA, 1998) and other state studies (Wickizer, 1999; Liu, 2002), we use data of hospital charges specific to Montana along with estimates of alcohol attributable fractions of incidence compiled from national studies to estimate inpatient costs.

Table 3.1 Alcohol Induced Medical Care Costs, Montana Millions of Dollars		Over 90 percent of Montana hospital discharges are recorded in the MHA’s (Association of Montana Health Care Providers) COMPdata database, made available for this study through the cooperation of that organization. We matched those data with the diagnosis codes corresponding to alcohol-induced conditions for discharges over the year 2006, with the results shown in Table 3.1.
<u>Service</u>	<u>Costs</u>	
Private Hospital Charges		There were 7,128 patients discharged from Montana hospitals recorded in the COMPdata database in 2006 from conditions wholly or partially due to alcohol abuse, resulting in more than \$124 million of hospital charges. However, many of these discharges were for conditions like pneumonia and hypertension that have relatively small alcohol attributable fractions (AAF). Using AAF’s from national research, we estimate that 2,323 discharges were due to alcohol abuse, resulting in hospital charges of just under \$34 million.
Inpatient services		
Alcohol Illnesses	\$34.0	
Alcohol complications	7.2	
Outpatient services	11.6	
VA Hospital	2.8	
Total Hospital Charges	55.6	
Physician Charges	32.2	
Prescription Drug Charges	9.7	
Nursing Home Care	3.2	
<b>Total, Medical Spending</b>	<b>\$100.7</b>	

To this we must add the costs that result from the additional complications imposed when heavy users of alcohol are treated for non-alcohol related conditions. A Texas study (Liu, 2002) computed that length of stay in hospitals for those with alcohol co-morbidity was 38 percent higher than the remaining patients, aggregated across all diagnostic categories.

We were unable to directly estimate this impact with the MHA data. Noting that the NIAAA/NIDA study (Harwood, et. al., 1998) found that the complications of alcohol use pushed up the total hospital charges for alcohol use by 21.5 percent, we estimate that Montana hospital costs due to alcohol complications for non-alcohol diagnoses to be \$7.2 million.

Montana is one of the heaviest users of hospital outpatient services in the nation. According to American Hospital Association, in 2006 there were 3,065 visits to hospitals in the state for outpatient services – which includes emergency room visits – per 1,000 population. This is 52 percent higher than the national average of 2,007 visits per 1,000 population, and higher than all but four other states.

Outpatient records comparable to the MHA data for inpatient discharges were not available for Montana. Thus we have adopted national estimates of alcohol-attributable outpatient expenditures (\$1.88 billion in 1992) to adjust for medical care inflation and Montana's population size. Since Montana's usage rates for outpatient services are considerably higher than the national average, this results in a conservative estimate of outpatient costs. We estimate alcohol-related outpatient costs to Montana hospitals to be \$11.6 million.

Finally, we need to add hospital charges from the Veterans Administration (VA) system. Individual level data on discharges used to separate alcohol induced illnesses as described above for community hospitals were not available. However, we note that hospital charges due to alcohol for the latter were about 2.5 percent of total expenditures. Total VA hospital expenditures in Montana in 2005 were \$109 million. Thus a reasonable estimate of alcohol-related VA expenditures in Montana would be \$2.8 million.

Adding these together, as shown in Table 3.1, this brings the total for Montana hospital expenditures due to alcohol to \$55.6 million.

#### *Other Medical Expenditures*

Other categories of alcohol-induced medical expenditures were based on proportionate shares of total state spending:

- **Doctors and physicians expenses.** In 2004, expenditures on doctors and physicians in Montana was \$1.1 billion, or about 58 percent as large as the \$1.9 billion spent on hospital care. We estimate that alcohol-induced spending on physicians to be proportionate to the hospital spending figure computed above, or \$32.2 million.

- **Prescription drug charges.** Updating the results of the NIDA/NIAAA study on alcohol-induced prescription drug costs for the national economy, using medical price inflation and Montana's population size, we estimate that prescription drug costs due to alcohol for Montana to be \$9.7 million.
- **Nursing home costs.** National studies estimated that nursing home expenditures attributable to alcohol abuse are about 1 percent of total nursing home spending. Thus we estimate that nursing home costs attributable to alcohol in Montana to be \$3.2 million.

### *Conclusion*

Summing across all categories, Table 3.1 shows that Montana's alcohol-induced medical expenditures are \$100.7 billion and include:

- inpatient hospital care for alcohol-induced conditions;
- inpatient hospital care for alcohol-related complications to non-alcohol diagnoses;
- outpatient care;
- care at VA facilities;
- physician care;
- prescription drugs; and
- nursing home care.

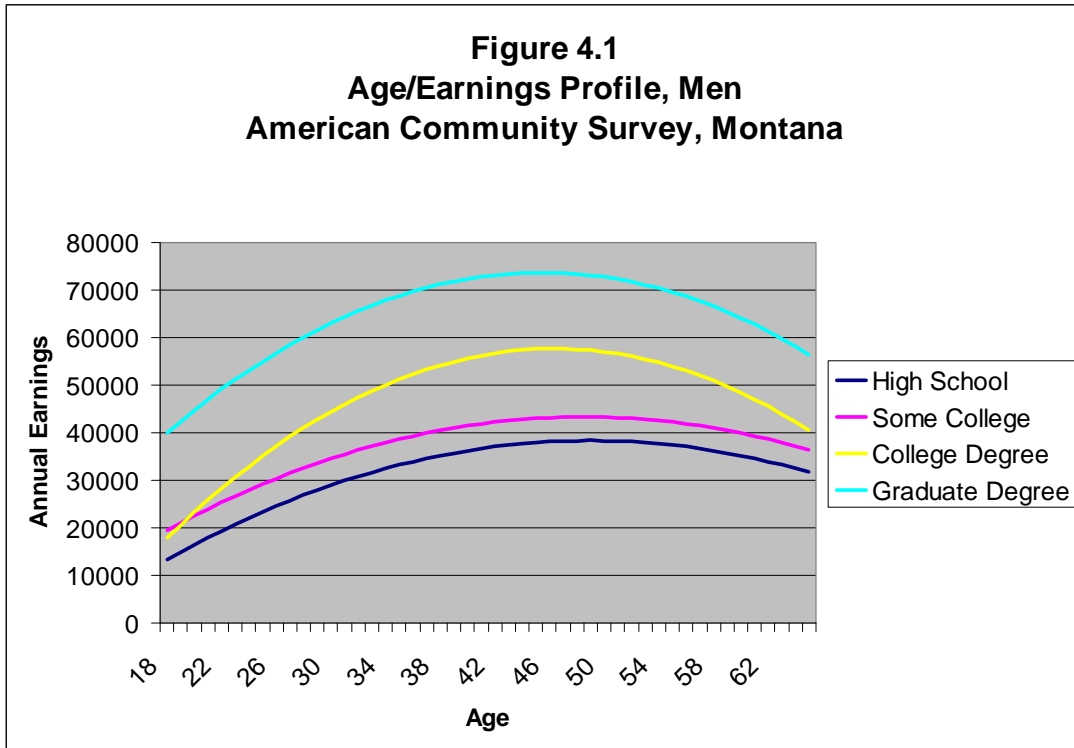


#### 4. Mortality

Premature death due to alcohol is a tragic event for the families and children directly affected by the loss. It also imposes a significant cost on the economy. Were it not for the involvement of alcohol, these individuals could be expected to continue productive lives, caring for families, paying taxes and accumulating assets. One way of measuring the cost of alcohol, therefore, is to tally the earnings those who died could have been expected to enjoy had their lives not been prematurely ended.

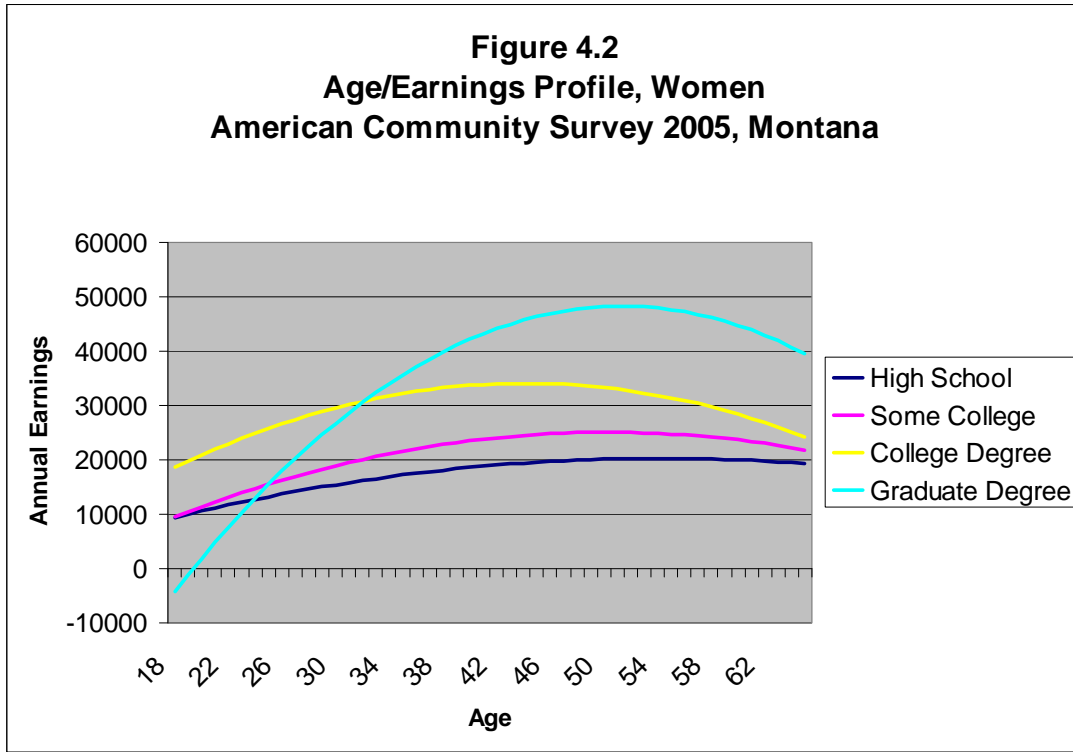
While forecasting individual earnings is difficult, statistical models of earnings for groups of individuals, classified by age, sex and education, produces adequate results. Using Montana data for 2005 from the American Community Survey conducted by the U.S. Bureau of the Census, we fit age/earnings profiles for men and women separately, broken down into four educational attainment levels: high school or less, some college, a 4 year college degree and post graduate education.

As shown in the estimated profiles shown in Figure 4.1 and 4.2, earnings for all sex/education categories grows with age until middle age, declining slightly afterwards. These profiles reflect rates of pay, work hours and labor force participation.



These profiles were used to produce a predicted earnings stream for each individual whose premature death could be attributable to alcohol, based on their age, sex, and

**Figure 4.2**  
**Age/Earnings Profile, Women**  
**American Community Survey 2005, Montana**



education. But since an individual who dies today would otherwise have reaped those earnings in the future, two additional adjustments must be made.

First, future earnings were adjusted for anticipated growth in future wage rates. On an inflation-adjusted basis, earnings per job in Montana have grown by an average of 0.7 percent per year since 1990. This growth rate was used to adjust the profile of future years from the 2005 base year..

However, in order to estimate the economic cost today of lost earnings that occur at some point in the future, we must apply a discount factor to reflect that fact that losses incurred in the future are less painful than those incurred today. In inflation-adjusted terms, a discount rate of 2 percent was appropriate. Finally, we sum the discounted future earnings for the remainder of the individual’s working life, had they not died due to alcohol. For computational purposes, we assumed that individuals would work until age 65.

To give a concrete example of this, suppose that a 41-year-old man with a college education dies in an alcohol-related motor vehicle crash. To compute the sum of lost earnings, we would add up 24 years of earnings as predicted by the age/earnings profile, growing each successive year by 0.7 percent to account for wage growth and reducing each year by 2 percent per year to discount future earnings to the present.

Table 4.1  
Alcohol-Induced Causes of Death

<u>ICD-9 or ICD-10 Code</u>	<u>Cause</u>
E244	Alcohol-Induced Pseudo-Cushings Syndrome
G721	Alcoholic Myopathy
K860	Alcohol-Induced Chronic Pancreatitis
291	Alcoholic Psychoses
303	Alcoholic Dependence Syndrome
3050	Non-dependent Abuse of Alcohol
F10	Mental and Behavioral Disorders Due to Alcohol Use
G312	Degeneration of Nervous System Due to Alcohol
3575,G621	Alcoholic Polyneuropathy
4255,I426	Alcoholic Cardiomyopathy
5353,K292	Alcoholic Gastritis
5710-5713	Alcoholic Chronic Liver Disease and Cirrhosis
K70	Alcoholic Liver Disease
7903	Excessive Blood Level of Alcohol
R780	Finding of Alcohol in Blood
860	Accidental Poisoning by Alcohol, NEC
T51	Toxic Effects of Alcohol
X45	Accidental Poisoning by and Exposure to Alcohol
X65	Intentional Self-Poisoning by and Exposure to Alcohol
Y15	Poisoning by and Exposure to Alcohol, Undetermined Intent

*Alcohol as a Cause of Death*

According to the death certificates recorded in Montana in 2005, there were 314 deaths with underlying or contributing cause of death among the 20 different diagnostic categories shown in Table 4.1. As shown in Table 4.2, alcohol-induced deaths are much more likely to occur with men than women, and occur at a much younger age, on average, than the overall population (50.3 years for alcohol-induced death versus 73.6 years for the overall population).

Table 4.2  
Deaths Recorded in Montana, 2005

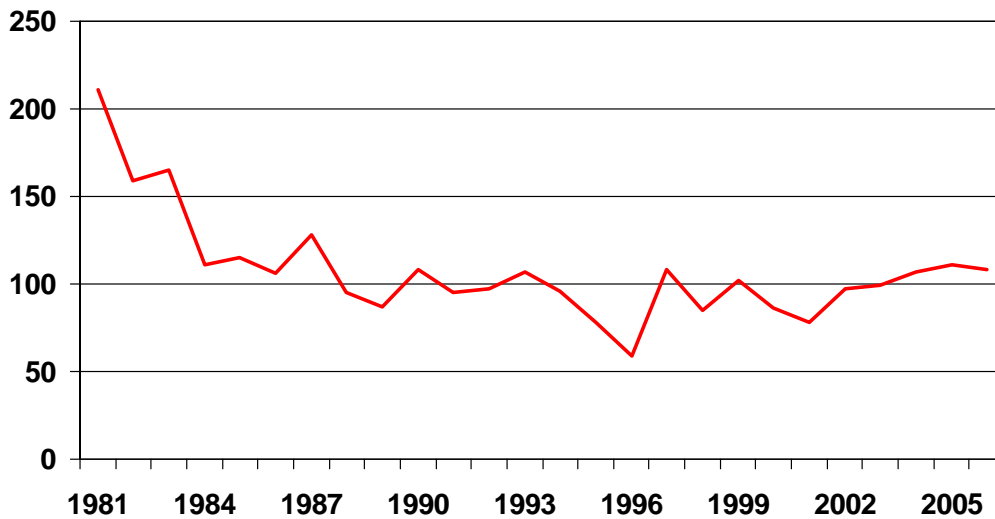
	<u>Total</u>	<u>Alcohol- Induced</u>
Deaths	8,803	314
Male, Percent	50.5	72.6
Female, Percent	49.5	27.4
Average Age, Years	73.6	50.3

Taking the detailed individual information obtained from death certificates, we computed lost earnings resulting from the excessive mortality as described above. We find that the present value of lost earnings to the Montana economy resulting from alcohol-induced deaths from the causes listed in Table 4.1 to be \$206 million.

*Motor Vehicle Alcohol-Related Crash Fatalities*

Alcohol use imposes a tragic cost in human life on Montana’s highways each year. The combination of alcohol-induced impairment and the use of a motor vehicle can be a lethal combination. In 2006, 108 people died in alcohol-related motor vehicle crashes in Montana. As shown in Figure 4.3, there has been little movement in this fatality total – or, for that matter, the injuries shown in Figure 4.4 -- over the last 20 years. As can be seen from Figure 4.5, the fatalities are higher in more populated counties, but disturbingly high fatality totals also occur in some rural counties as well.

Figure 4.3  
Motor Vehicle Alcohol-Related Crash Fatalities  
Montana, 1981-2006





on age, sex and education. We find that alcohol induced highway fatalities resulted in a loss of \$96.2 million in 2006.

### *Conclusion*

Undoubtedly the use of alcohol results in deaths beyond those noted in this section, through falls, drownings, fires and other mishaps. Yet from just these two sources of data – death certificates, and motor vehicle crash reports -- we find that early death due to alcohol imposes a cost of \$312.2 million on the Montana economy each year in the loss of earnings imposed by excess mortality.

## 5. Morbidity

It is well known that the consumption of alcohol is associated with impairments that can affect one's ability to function and earn a living in a number of ways. Alcohol affects the motor skills and decision-making ability of individuals. Heavy drinking can also affect tardiness, absenteeism and productivity while on the job. Since alcohol use is prevalent in Montana, and in particular, rates of heavy drinking in the population are higher than the national average, we might expect that the economy ultimately pays a price for the deleterious effects of alcohol consumption on individual productivity.

This section represents an initial attempt to quantify what is a highly complex issue – namely, how much does drinking behavior affect economic productivity. We have applied methods used in other studies, adapted to Montana-specific data, to compile an aggregate estimate of the value of lost economic output.

The pivotal elements of the analysis are age and sex-specific average impairment rates published in national level studies (Rice, et. al., 1990). These represent a percentage reduction in output and earnings for heavy drinkers in each category. They can come about by a variety of means.

First, there is a reduction in productivity while on the job, caused by either drinking during working hours or, say, the morning after the day of heavy drinking. There is also the impact of higher absenteeism or sick days resulting in less time on the job. Finally, there is the closing off of more promising career opportunities that might have been available were the individual not a heavy drinker. Impairment rates rise with age as the medical complications of heavy drinking become more prominent and loss of work time becomes more significant.

### *Heavy Drinking in Montana by Age/Sex*

The best available information on the incidence of drinking in the Montana population comes from the Center for Disease Control's Behavioral Risk Factor Surveillance Survey (BRFSS). This is a national survey conducted annually to assess the incidence of risky behavior in adult populations. Since Montana is a relatively sparsely-populated state, we have averaged the BRFSS estimates for 2004 through 2006 for three different definitions of heavy drinking: those who consume three or more drinks per day (two or more per day for females); those who are coded as heavy drinkers by the CDC based on the answers given to multiple questions; and binge drinkers who said that they consumed five or more drinks on one occasion (four or more for females) within the last two weeks.

As shown in Table 5.1, the choice of definition matters a great deal in assessing the extent of heavy drinking behavior in Montana. By any definition, rates at the younger ages are considerably higher, particularly for binge drinking behavior. In order to produce a more conservative estimate, we have chosen the CDC's multiple-question definition of heavy drinking behavior in the remainder of this analysis.

Table 5.1  
 BRFSS Responses on Heavy Drinking  
 Montana, 2004-06

Sex	Age	Based on Drinks per Day*	Based on Multiple-Question Coding	Based on Binge Drinking
Males	18-24	39.0%	11.2%	37.3%
	25-34	34.8%	5.6%	36.8%
	35-44	26.6%	5.5%	25.4%
	45-54	21.8%	5.8%	20.9%
	55-64	15.8%	5.3%	16.9%
	65+	10.4%	3.9%	6.5%
Female	18-24	40.9%	7.3%	23.3%
	25-34	36.2%	6.0%	16.5%
	35-44	31.3%	5.8%	11.6%
	45-54	26.1%	4.3%	7.7%
	55-64	17.6%	5.3%	4.3%
	65+	9.6%	3.6%	1.7%

\* = three or more drinks/day (men), two or more drinks/day (women)



Table 5.2  
Earnings Loss Due to Alcohol Abuse, Montana

Sex	Age	Population	Employed	Unemployed	Heavy			Average Earnings	Impairment Rates	Average Earnings Loss	Total Earnings Loss (mill \$)	
					Drinkers	Population	Employed					Unemployed
Males	18-24	44,454	37,462	6,992	11.2%	4,991	4,206	785	\$13,644	1.4%	\$191.02	0.803
	25-34	54,625	48,967	5,658	5.6%	3,043	2,727	315	\$32,123	3.0%	\$963.69	2.628
	35-44	58,092	48,905	9,187	5.5%	3,222	2,713	510	\$43,910	5.5%	\$2,415.05	6.551
	45-54	74,109	60,909	13,200	5.8%	4,318	3,549	769	\$44,349	5.5%	\$2,439.20	8.657
	55-64	56,535	36,768	19,767	5.3%	3,000	1,951	1,049	\$42,244	9.3%	\$3,928.69	7.665
	65+	53,376	9,063	44,313	3.9%	2,080	353	1,727	\$29,035	9.3%	\$2,700.26	0.954
Female	18-24	42,273	35,296	6,977	7.3%	3,073	2,566	507	\$9,884	0.8%	\$79.07	0.203
	25-34	52,890	39,910	12,980	6.0%	3,168	2,391	778	\$19,433	2.8%	\$544.12	1.301
	35-44	62,843	48,111	14,732	5.8%	3,622	2,773	849	\$23,237	11.9%	\$2,765.20	7.667
	45-54	79,361	63,269	16,092	4.3%	3,418	2,725	693	\$26,273	11.9%	\$3,126.49	8.519
	55-64	53,692	31,966	21,726	5.3%	2,844	1,693	1,151	\$24,471	18.7%	\$4,576.08	7.748
	65+	66,836	8,740	58,096	3.6%	2,377	311	2,066	\$10,406	18.7%	\$1,945.92	0.605
Total		699,086	469,366	229,720		39,156	27,957	11,198				53.301

Applying these impairment rates to the age/sex cohorts in the Montana population yields an estimate of the total number of heavy drinkers in the state, as well as the breakdown by age and sex. Since we are interested in the impact of drinking behavior on economic output, we restrict our attention to those in each age/sex category who are in the workforce, as detailed in the Census's American Community Survey. This is shown in Table 5.2.

We estimate that about 27,000, or about 71 percent, of the roughly 39,000 heavy drinkers in Montana are employed in the workforce. Applying the national impairment estimates to their average earnings yields estimates of earnings loss due to alcohol. These range from a low of \$79 per year for females aged 18-24, up to more than \$4,500 per year for women aged 55-64.

As shown in the table, we estimate the productivity impacts to the Montana economy from those in the workforce who are heavy users of alcohol to be \$53.3 million. This does not include the impact on the economy of those engaged in non-market work (e.g., keeping up homes, providing for families) that is likely to be similarly affected.

## 6. Crime

Alcohol – as well as illegal drugs -- are contributing factors in a substantial amount of criminal activity. Certain categories of crimes are far more likely when the perpetrators are under the influence of alcohol. Some crimes, such as driving while intoxicated, liquor law violations or public drunkenness, involve alcohol by definition. Others, such as felonious assault and even homicide, are at least partially attributable to alcohol.

Crime itself imposes an enormous cost on our society. Because of crime, we spend money on law enforcement, courts, and prisons. Crime affects our behavior, raises our insurance rates, and makes us spend money on locks, lighting and alarm systems. Crime also can impose a terrible cost on victims and even the criminal's own families.

Table 6.1  
Police Protection Costs By Type of Offense, 2005

<u>Type of Offense</u>	<u>Number</u>	<u>Percent of Total</u>	<u>Percent Due to Alcohol</u>	<u>Alcohol Costs (\$thous.)</u>
Homicide	32	0.0%	30.0%	15
Felonious Assault	2,307	2.1%	26.9%	964
Robbery	244	0.2%	3.9%	15
Burglary	3,896	3.6%	4.7%	285
Larceny -Theft	26,505	24.6%	3.8%	1,565
Driving Under Influence	6,549	6.1%	100.0%	10,178
Liquor Laws	4,383	4.1%	100.0%	6,812
Public Drunkenness	0	0.0%	100.0%	0
Stolen Property	113	0.1%	0.0%	0
Prostitution	14	0.0%	0.0%	0
Drug Laws	5,328	4.9%	0.0%	0
Disorderly conduct	5,908	5.5%	0.0%	0
Vagrancy	0	0.0%	0.0%	0
Other Offenses	52,548	48.7%	0.0%	0
<b>Total</b>	<b>107,827</b>	<b>100%</b>		<b>19,834</b>

Thus it makes sense to consider the crime that is causally linked to alcohol use as cost to society – governments, businesses and individuals – that is due to alcohol use. If it were not for alcohol, we would spend less on law enforcement, courts, incarceration, as well as

realize less personal and property damage. Were it not for alcohol, the resources we spend on those things could be freed for other uses, thus it is appropriate to consider what we do spend to be a cost.

Following other studies, we consider three categories of crime costs – police protection, courts and adjudication, and incarceration. We rely on national studies for estimates of the proportion of crimes by type that can be said to be attributable to alcohol, and apply these results to Montana criminal justice system data.

*Police Protection Costs*

In 2005, more than \$167 million was spent in Montana on police protection. In order to estimate how much less could have been spent had there been no alcohol abuse, we made a simplifying assumption – namely, that police costs were proportional to criminal offenses. This allows us to estimate a reduction in costs in proportion to the number of offenses committed that are attributable to alcohol.

Table 6.2  
Legal and Adjudication Costs Type of  
Offense, 2005

<u>Type of Offense</u>	<u>Number</u>	Percent of <u>Total</u>	Pct. Due to <u>Alcohol</u>	<u>Alcohol Costs (\$thous.)</u>
Homicide	32	0.0%	30.0%	7.5
Felonious Assault	2,307	2.1%	26.9%	487.6
Robbery	244	0.2%	3.9%	7.5
Burglary	3,896	3.6%	4.7%	143.9
Larceny -Theft	26,505	24.6%	3.8%	791.4
Driving Under Influence	6,549	6.1%	100.0%	5,145.6
Liquor Laws Public	4,383	4.1%	100.0%	3,443.7
Drunkenness	0	0.0%	100.0%	0.0
Stolen Property	113	0.1%	0.0%	0.0
Prostitution	14	0.0%	0.0%	0.0
Drug Laws	5,328	4.9%	0.0%	0.0
Disorderly conduct	5,908	5.5%	0.0%	0.0
Vagrancy	0	0.0%	0.0%	0.0
Other Offenses	52,548	48.7%	0.0%	0.0
Total	107,827	100%		10,027.1

Table 6.1 presents the computations for alcohol-related police protection costs. As shown in the table, there were almost 108,000 known criminal offenses in Montana in 2005. Of those, more than 12,500, or 11.8 percent, were arguably caused by alcohol.

Most offenses had no relation to alcohol, still others, such as DUI, were 100 percent attributable to drinking. Homicide, felonious assault, robbery and burglary fell between these extremes.

We estimate that police protection costs were \$19.8 million higher in Montana due to alcohol than they otherwise would have been.

*Legal and Adjudication Costs*

Under the simplifying assumption that legal and adjudication costs are proportional to the number of offenses processed, we can use a similar method to estimate alcohol-induced costs on the court system in Montana. In 2005 the courts cost about \$84 million to run. As shown in Table 6.2, we estimate that alcohol use made this figure about \$10 million higher than it otherwise would have been.

*Incarceration Costs*

Table 6.3  
Local Corrections Costs by Type of Offense, Montana 2005

<u>Type of Offense</u>	<u>Number</u>	<u>Percent of Total</u>	<u>Percent Due to Alcohol</u>	<u>Alcohol Costs (\$ thous.)</u>
Homicide	32	0.0%	30.0%	2.1
Felonious Assault	2631	2.4%	26.9%	157.4
Robbery	244	0.2%	3.9%	2.1
Burglary	3896	3.6%	4.7%	40.7
Larceny-Theft	26505	24.6%	3.8%	224.0
DUI	6549	6.1%	100.0%	1,456.4
Liquor Laws	4383	4.1%	100.0%	974.7
Public Drunkenness	0	0.0%	100.0%	0.0
Stolen Property	113	0.1%	0.0%	0.0
Prostitution	14	0.0%	0.0%	0.0
Drug Laws	5328	4.9%	0.0%	0.0
Disorderly Conduct	5908	5.5%	0.0%	0.0
Vagrancy	10	0.0%	0.0%	0.0
Other Offenses	52224	48.4%	0.0%	0.0
Total		100.0%		2,857.5

We again make the simplifying assumption that incarceration costs are proportional to the number of prisoners held at state and local correctional facilities. However, the analysis in this instance is complicated by the fact that prisoners are often imprisoned for multiple

offenses, each with different sentence lengths. Thus it is difficult to say, at any point in time, what unique proportion of the population is incarcerated for a given offense.

For local jails and other corrections facilities, where sentences are comparatively shorter, we can still use the distribution of arrests among offenses to apportion costs. In 2005, about \$23.9 million was spent on local jails in Montana. Using arrests by offense and alcohol attribution rates as before, we estimate that \$2.8 million of this amount was due to alcohol, as detailed in Table 6.3.

There were 3,509 inmates in state correctional facilities on December 31, 2005, according to the U.S. Bureau of Justice Statistics (BJS). Many prisoners are held for convictions on multiple offenses. A national BJS study conducted in 2003 decomposed the U.S. prison population according to type of offense. We have used these proportions,

Table 6.4  
Montana Correctional Costs by Type of Offense Due to Alcohol, 2005

Offense	Percent of Total inmates	Inmates	Percent Due to Alcohol	Costs due to Alcohol
Violent offenses	51.8	1,818		
Homicide	12.1	425	30	4,837.8
Manslaughter	1.4	49	30	559.7
Rape	4.9	172	30	1,959.1
Other sexual assault	7	246	30	2,798.7
Robbery	14.1	495	3.4	638.9
Assault	9.9	347	30	3,958.2
Other violent	2.5	88	30	999.5
Property offenses	20.9	733		
Burglary	11	386	3.6	527.8
Larceny	3.9	137	2.8	145.5
Motor vehicle theft	1.6	56	3.9	83.2
Fraud	2.4	84	0	0.0
Other property	1.9	67	0	0.0
Drug offenses	20	702	0	0.0
Public-order offenses	6.9	242	0	0.0
Other/unspecified	0.5	18	0	0.0
Total	100.1	3,509		16,508.4

applied to the Montana prisoners at state correctional facilities, to estimate alcohol related incarceration costs at state facilities.

As shown in Table 6.4, roughly half of the state's prisoners at its facilities are incarcerated for violent offenses. Apportioning the states \$133 million spent on corrections in 2005 to those prisoners who can arguably be said to have committed crimes due to alcohol, we estimate that expenditures for state prisons because of alcohol abuse are \$16.5 million.

### *Conclusion*

There are several important categories of costs that are not captured by this report, but would likely contribute significantly to the costs of crime due to alcohol as reported here. These include:

- costs to victims, including disability, foregone earnings, and insurance and crime protection costs;

- foregone earnings by inmates whose incarceration effectively removes their contributions to economic output; and
- costs to criminal's families due to loss of parent.

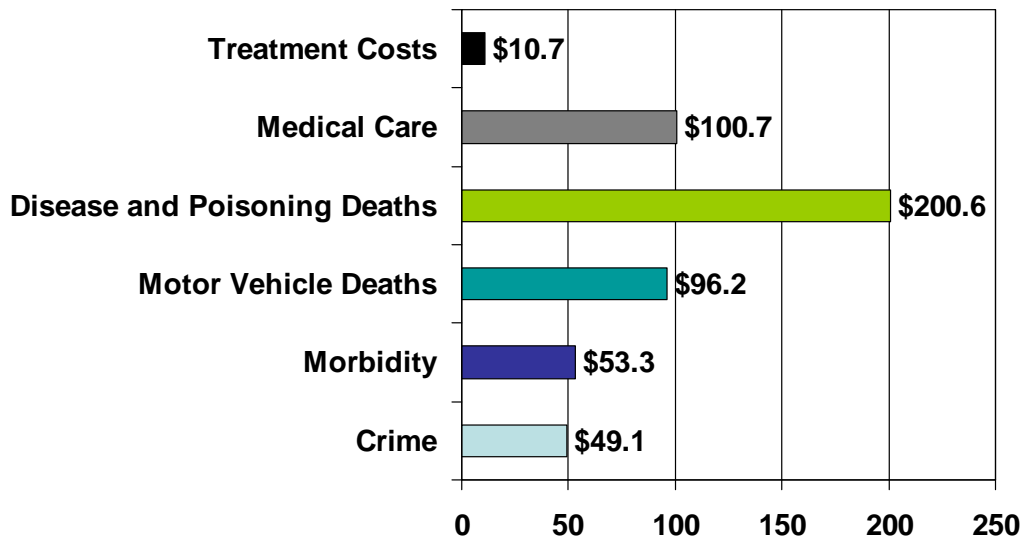
Even with these omissions, we find the cost of alcohol abuse on the Montana economy through its impact on crime to be substantial. Taken together, the extra costs borne by businesses, individuals and governments in Montana for police protection, courts and criminal justice system administration, and corrections amount to \$49.1 million per year.



## 7. Summary and Conclusion

This study has attempted a comprehensive evaluation of the costs borne by individuals, businesses and governments as a result of the undesirable side effects of excessive alcohol consumption. Our aim has been two-fold. First, we have sought to quantify the negative impacts of alcohol consumption to bring the scope of the problem into clearer focus when compared to other demands on scarce public funds. Second, we wanted to identify the wide diversity of mechanisms set into place by the simple act of consuming alcohol that produce outcomes that make us collectively poorer.

Figure 7.1  
The Economic Cost of Alcohol Abuse in Montana  
Millions of dollars



This research clearly indicates that alcohol imposes a significant cost on all of us in the state of Montana. As shown in Figure 7.1, we collectively spend \$510.6 million, or about 1.7 percent of the total state economy as measured by GDP, dealing with the consequences of alcohol consumption. Those costs come about through a wide variety of ways:

*Alcohol treatment centers.* We spend \$10.7 million a year treating men and women of all ages for the symptoms of alcohol abuse at the 46 state-license facilities located around the state.

*Medical costs.* Alcohol use is causally linked to a broad spectrum of medical conditions that require treatment and care. Moreover, care for non-alcohol related

conditions is more complex and thus more expensive for patients who are also alcohol abusers. Because of this, we spend \$100.7 million on medical care that would not otherwise be incurred in a world with no alcohol abuse.

*Premature mortality.* Alcohol causes premature death, and with loss of life comes a loss of earnings and productivity that would otherwise have taken place. That is a huge cost to the economy – we estimate that the value of lost earnings due to early death in 2005 was \$296.8 million. Of this total, \$200.6 million was due to death caused by alcohol induced medical ailments, and \$96.2 million was due to deaths caused by alcohol-caused motor vehicle crashes.

*Morbidity.* Alcohol causes impairment, which translates into reduced ability to function in the workplace. The loss in economic output due to lost productivity is sizable – we estimate that \$53.3 million more could be produced throughout the state economy if the debilitating impact of alcohol could be avoided.

*Crime.* Alcohol affects judgement, and is a precipitating factor in the commission of many types of crime, including assault, rape, and homicide. The costs incurred in law enforcement, administration of courts and incarceration of criminals convicted of crimes that occur because of alcohol abuse amounts to \$49.1 million.

Of course, the tragedies that can result from alcohol abuse – such as those listed above – produce a toll on families and individuals that goes beyond dollars and cents. But the quantification we attempt to carry out in this study can at least bring to light the economic side of the story.

Moreover, there are a number of costs inflicted by alcohol that the available data did not allow us to estimate and include in the total reported above. These include:

*Fire.* Each year, fires are started by those who have been drinking, causing property losses, injuries and possibly loss of life. They also are reflected in higher insurance premiums paid by drinkers and non-drinkers alike.

*Loss of function from alcohol-related injuries.* We were unable to obtain good estimates on the degree to which the productive abilities of those who have been injured because of alcohol-related accidents – either on the highways or elsewhere – have been affected as a result.

*Victim costs resulting from crimes.* The losses to those affected by alcohol-induced criminal activity – both the crime victims as well as the families and children of the criminals – are not reflected in this report.

The exclusion of these items makes it likely that the true cost of alcohol abuse is higher than the \$510.6 million reported above.

One final point should be made. The cost of alcohol abuse to the state economy goes on year after year. With no intervention to bring these costs under control, we can expect to pay a tax – in the form of a smaller economic pie than we would otherwise enjoy – of a half a billion dollars each year that our collective drinking behaviors produce outcomes like those reported in this study.

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