The Economic Costs of Alcohol Abuse

The burden imposed by a disease can be measured in many ways. These measures include the number of deaths attributed to a particular disorder, the total number of cases at a given time, the number of new cases that occur in a given year, hospitalization rates, potential years of life lost to a disease, and more comprehensive measures that combine mortality and quality-of-life information.

Another approach to assessing the burden of disease is to estimate the associated "cost of illness" (COI). Studies of COI provide a framework for expressing in dollar terms the multidimensional impact of a health problem. Typically, a COI study of a particular health problem includes estimates of the costs of health care services, losses in productivity from illness and premature death, and other expenditures and resource losses that can be attributed to the health condition. For many diseases, the COI estimates run well into the billions of dollars. Estimates for different diseases often are not directly comparable to one another, however, because of variations in methods, data sources, and underlying assumptions (National Institutes of Health 1997).

Over the past two decades, five major studies have used the COI framework to estimate the economic costs of alcohol abuse in the United States (Berry et al. 1977; Cruze et al. 1981; Harwood et al. 1984, 1998; Rice et al. 1990). These studies present estimates of the costs of alcohol abuse on the basis of analyses of health care costs, productivity losses, and various additional costs, such as those associated with alcohol-related crime and motor vehicle crashes. In this context, the term "alcohol abuse" refers to any cost-generating aspect of alcohol consumption. This differs from the clinical definition of the term, which involves specific diagnostic criteria. Thus, the costs associated with a single occasion of drunk driving that leads to injury or property damage would be counted in this framework, even though this behavior would not, by itself, meet the clinical criteria for a diagnosis of alcohol abuse.

In the most recent of these COI studies, the research group estimated the overall economic cost of alcohol abuse at $148 billion for 1992, the most recent year for which adequate data were available at the time the study was undertaken (Harwood et al. 1998). Making adjustments for population growth and inflation, the authors also projected their estimates forward to 1995, for which the overall estimated cost was $166.6 billion. A subsequent update further projected the estimates to 1998, for which the overall estimated cost was $184.6 billion (Harwood 2000). This 1998 estimate amounted to roughly $683 for every man, woman, and child living in the United States in 1998. Unless otherwise noted, cost figures reported in this section are drawn from the update for 1998.

More than 70 percent of the estimated costs of alcohol abuse were attributed to lost productivity ($134.2 billion), most of which resulted from alcohol-related illness or premature death. Most of the remaining estimated costs were expenditures for health care services to treat alcohol use disorders and the medical consequences of alcohol consumption ($26.3 billion, or 14.3 percent of the total), property and administrative costs of alcohol-related motor vehicle crashes ($15.7 billion, or 8.5 percent), and various criminal justice system costs of alcohol-related crime ($6.3 billion, or 3.4 percent). A breakout of the estimated costs for 1992 and the associated projections for 1998 is shown in table 1; the percentage distribution is shown in figure 1.

The new estimates and projections are the latest since a 1990 report that estimated the economic costs of alcohol abuse by using data for 1985 (Rice et al. 1990). The estimate by Harwood

Table 1: Estimated economic costs of alcohol abuse in the United States, 1992 and 1998*

Economic Cost	1992 ($ millions)	1998 (Projected) ($ millions)
Health care expenditures		
Alcohol use disorders: treatment, prevention, and support	5,573	7,466
Medical consequences of alcohol consumption	13,247	18,872
Total	18,820	26,338
Productivity impacts		
Lost productivity due to alcohol-related illness	69,209	87,622
Lost future earnings due to premature deaths†	31,327	36,499
Lost productivity due to alcohol-related crime	6,461	10,085
Total	106,997	134,206
Other impacts on society		
Motor vehicle crashes	13,619	15,744
Crime	6,312	6,328
Fire destruction	1,590	1,537
Social welfare administration	683	484
Total	22,204	24,093
Total costs	**148,021**	**184,636**

*The authors estimated the economic costs of alcohol abuse for 1992 and projected those estimates forward to 1998, adjusting for inflation, population growth, and other factors.

†Present discounted value of future earnings calculated using a 6-percent discount rate.

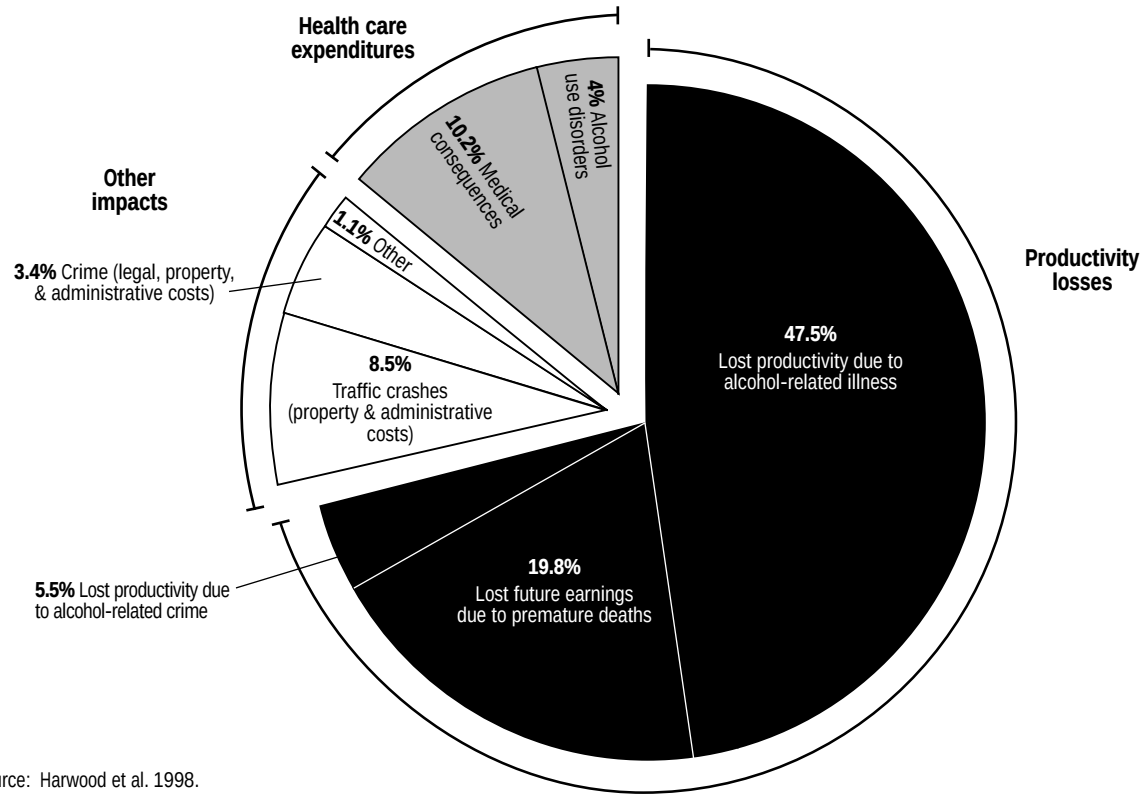
Sources: Harwood 2000; Harwood et al. 1998.

and colleagues for 1992 is 42 percent greater than the estimate by Rice and colleagues, even after accounting for increases that would be expected due to inflation and population growth. However, the estimate for 1992 is almost exactly equal to the average of the estimates from four other major studies, the Rice study included, dating back to 1977 (adjusting each of the earlier estimates for inflation and population growth). Although the estimates for 1985 and 1992 were developed using generally similar approaches, Harwood estimated that more than 80 percent of the increase reported in the newer study could be attributed to differences in data and methodology rather than to real increases in alcohol abuse or its consequences. Methodological and data factors were particularly important in contributing to higher estimates of productivity losses associated with alcohol-related illness and with health care costs for treating the medical consequences of alcohol misuse.

Distribution of the Burden of Costs

An innovative section in the 1998 study by Harwood and colleagues estimated how the burden of the costs of alcohol abuse is distributed across various segments of society (figure 2). This analysis, based on the data for 1992, found that much of the economic burden of alcohol abuse falls on segments of the population other than the alcohol abusers themselves. About 45 percent of the estimated total cost was borne by alcohol abusers and their families, almost all of which was due to lost or reduced earnings. About 20 percent of the total estimated cost of alcohol

Figure 1: Economic costs of alcohol abuse, United States, 1998
(Total estimated cost: $184.6 billion)



Source: Harwood et al. 1998.

abuse was borne by the Federal government and 18 percent by State and local governments. Nearly three-fourths of the costs borne by the Federal government were in the form of reduced tax revenues resulting from alcohol-related productivity losses, and most of the remaining Federal burden was for health care costs. Of the burden on State and local governments, reductions in tax revenue resulting from productivity losses accounted for just over half, while 38 percent was for criminal justice and motor vehicle-related costs. Private insurance arrangements (including life, health, auto, fire, and other kinds of insurance) shouldered the burden for 10 percent of the total estimated cost, primarily in the areas of health care costs and motor vehicle crashes. Six percent of the total cost was borne by victims of alcohol-related crimes (including homicide) and by the non-drinking victims of alcohol-related motor vehicle crashes.

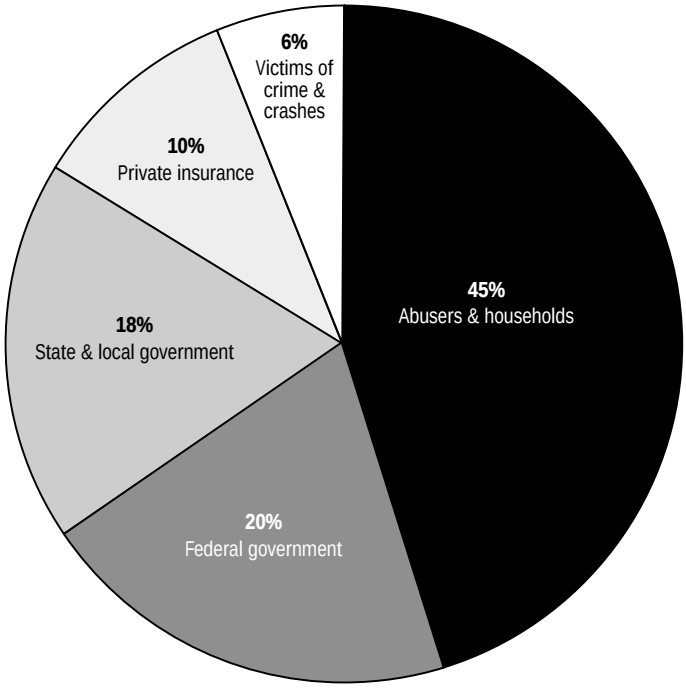
Components of the Costs of Alcohol Abuse

The estimated cost of alcohol abuse was constructed from estimates of numerous smaller categories and subcategories of costs, which were based on a wide variety of methods and data sources. These smaller categories, in turn, fall in three general groups: health care costs, productivity losses, and other impacts. The main issues and findings associated with each of these broad areas are described below, followed by a discussion of some key caveats and limitations associated with the estimates.

Health Care Costs

Health care costs of alcohol abuse were estimated at $26.3 billion for 1998, representing a relatively modest fraction (14.3 percent) of the total estimated cost of alcohol abuse. This category includes both the costs of treating alcohol abuse

Figure 2: Distribution of the costs of alcohol abuse



Source: Harwood et al. 1998.

and dependence, estimated at $7.5 billion, and the considerably greater costs of treating the adverse medical consequences of alcohol consumption, estimated at $18.9 billion. Each of these subcategories comprises a number of components, such as costs incurred in different treatment settings or for different categories of providers, reflecting both the pervasive health consequences of alcohol consumption and the complexity of the Nation's health care system.

The costs associated with treating alcohol use disorders (alcohol abuse and alcohol dependence) include costs incurred in a variety of community-based settings (such as hospitals, residential treatment facilities, outpatient clinics, and physicians' offices), costs incurred in other settings (primarily in facilities operated by the U.S. Department of Veterans Affairs), and expenditures for alcohol abuse prevention efforts. Also included in this category are various support costs, such as training for counselors and other professionals in alcohol abuse prevention and treatment, costs of research on alcohol abuse (estimated as the budget for the National Institute on Alcohol Abuse and Alcoholism), and administrative costs for health insurance associated with these treatment expenses. Collectively, these support costs represented 2.1 percent of the estimated health care costs, or 0.3 percent of the overall estimated cost.

The costs of treating the medical consequences of alcohol consumption—as distinct from the alcohol problems themselves—reflect the variety and seriousness of the health conditions for which alcohol consumption can be an underlying cause. Prominent examples of these conditions include liver disease, various cancers, stroke, and trauma. Because alcohol causes some but not all of the cases for many of these health problems, Harwood and colleagues adjusted the number of hospitalizations for each condition by applying factors called "alcohol-attributable fractions" (AAF's). These AAF's represent the proportion of deaths from various causes that are considered attributed to alcohol (Stinson et al. 1993). For example, AAF's range from 5 percent for diabetes

mellitus, to 20 percent for stomach cancer, to 75 percent for esophageal cancer, to 100 percent for alcoholic liver cirrhosis.

The researchers used the AAF's as a proxy for the proportion of hospitalizations attributable to alcohol for various diagnoses. They recognized that this approximation generated some imprecision in the estimate of hospital costs, because the proportion of hospitalizations for a given condition resulting from alcohol consumption might not equal the proportion of deaths from that condition that are attributable to alcohol. Although admittedly imperfect, this approach was adopted in an effort to reduce the systematic underestimation of these costs inherent in the methodology employed in the 1990 study.

Hospital costs represented about 44 percent of the estimated $18.9 billion spent in 1998 on health care for the medical consequences of alcohol consumption. The remaining costs in this category were associated with Fetal Alcohol Syndrome (FAS) (15 percent), outpatient care (13 percent), nursing homes (5 percent), pharmaceuticals (12 percent), other (nonphysician) health professionals (7 percent), and health insurance administration (5 percent).

Because of public and research interest in FAS, the various health care costs associated with this condition were estimated separately. FAS is a characteristic pattern of birth defects resulting from prenatal alcohol exposure. Symptoms of FAS include pre- and postnatal growth retardation and central nervous system anomalies, such as developmental delays, mental retardation, and skull or brain malformations. Overall costs for FAS include both health care costs and productivity losses attributable to FAS. Of the $2.8 billion in estimated health care costs of FAS in 1998, more than 90 percent was accounted for by the costs of providing home and residential care to adults with moderate to severe mental retardation associated with FAS, and by the costs of special education for children and adolescents with the range of mental impairments associated with FAS.

Productivity Losses

Productivity losses were estimated at $134.2 billion (72.7 percent of the total) for 1998, including losses due to premature deaths, alcohol-related illness, and alcohol-related crime. Estimating these costs presents a particular challenge because they are fundamentally unobservable: there is no direct way to measure the value of goods and services that go unproduced as a result of alcohol problems. Instead, analysts rely on the economic theory of competitive labor markets, which holds that workers' earnings reflect the value of their productive contributions. Following this line of reasoning, lower productivity will result in lower earnings, and the magnitude of the productivity loss may be approximated by the lost or foregone earnings. For example, alcohol-related premature deaths represent a loss of productive potential, and the amount that these individuals would have earned during the remainder of their lives provides an estimate of this loss. Similarly, alcohol use disorders can impair productivity, and the magnitude of this loss is represented by the reductions in earnings sustained by individuals as a result of their alcohol use disorders.

Losses From Illness. Productivity losses resulting from alcohol-related illness were estimated at $87.6 billion for 1998 (65.3 percent of estimated productivity losses and 47.5 percent of the estimated total cost). Nearly all of this estimate ($84.5 billion) represents impaired workplace and household productivity of individuals with a history of alcohol dependence. Of the remainder, lost work time for residential treatment of alcohol use disorders accounted for $1.9 billion, and productivity losses suffered by adults with FAS were estimated at $1.3 billion.

The estimate of impaired workplace productivity was developed using data from the 1992 National Longitudinal Alcohol Epidemiologic Survey (NLAES), a nationally representative data set designed to measure the incidence and prevalence of alcohol abuse and dependence according to well-defined clinical criteria. The researchers applied statistical models to the NLAES data to

estimate lost earnings and excess unemployment among individuals with a history of alcohol dependence. After adjusting the results to account for demographic differences between those with and without a history of alcohol dependence, the researchers found that the only statistically significant losses were for males. Moreover, these losses stemmed only from reduced earnings, not from excess unemployment. A key finding of interest was that earnings reductions among males with a history of alcohol dependence were much larger for those who began drinking before age 15 than for those who began drinking later.

Losses From Premature Deaths. Premature deaths attributed to alcohol consumption resulted in productivity losses estimated at $36.5 billion in 1998 (27.2 percent of estimated productivity losses and 19.8 percent of the estimated total cost). This was based on an underlying estimate of 107,360 deaths attributable to alcohol consumption in 1992. The productivity losses resulting from these deaths were estimated using data on the average expected additional years of life for men and women of different ages, had they not succumbed to an alcohol-related death, and the average expected value of their future earnings and contributions to household productivity.

Expected future earnings were expressed in "present discounted value" terms, a standard technique for expressing values that accrue at different times in comparable terms. Economists frequently disagree about the appropriate discount rate to use in specific applications; a recent expert panel report recommended that cost-effectiveness studies of health interventions use a discount rate of 3 percent (Gold et al. 1996). For the latest estimates, the researchers used a 6-percent discount rate for consistency with earlier studies. If they had used 3 percent instead, it would have increased the estimate of productivity losses due to premature deaths by about 46 percent.

Crime-Related Productivity Losses. Additional productivity losses due to alcohol-related crime were estimated at $10.1 billion (7.5 percent of productivity losses and 5.5 percent of the total). Perpetrators of these crimes who are incarcerated forfeit their productive potential; this loss was estimated at $9.1 billion for 1998. Also, victims of alcohol-related crimes often lose work time as a result of their victimization; these losses were estimated at $1.0 billion for 1998.

Other Impacts

Other impacts of alcohol abuse generated costs in two particularly important categories. Alcohol-related motor vehicle crashes generate various administrative and property damage costs in addition to their enormous costs in terms of deaths and injuries. The estimate for these property and administrative (insurance and legal) costs was $15.7 billion for 1998 (8.5 percent of the total cost estimate). In addition to its effects on productivity, alcohol-related crime burdens the criminal justice system, consuming police, legal, and corrections services. Based on estimates from a variety of sources that alcohol plays a causal role in 25 to 30 percent of violent crimes and 3 to 4 percent of property crimes, these additional costs of alcohol-related crime were estimated to be $6.3 billion for 1998 (3.4 percent of the total).

Limitations and Caveats

As with earlier studies of economic costs, the latest research in this area confirms that alcohol abuse imposes a heavy burden on society. Although estimates of the economic costs of alcohol abuse attempt to be as comprehensive as possible, and although the magnitude of costs revealed in these estimates is undeniably enormous, there are several important caveats that apply to the interpretation of these estimates.

First, the estimates should not be considered precise. For many of the areas in which costs are incurred, good data are not readily available. Some components—most notably the productivity losses—reflect quantities that are fundamentally unobservable. In these cases, the magnitude of costs must be based on theoretical reasoning and statistical inference. Many components of the total cost were estimated quite roughly using convenient approaches to

approximating costs. In addition, the estimation procedures employed do not permit the usual indicators of statistical precision for most of the components. These considerations suggest that the cost estimates—the total as well as the various components—are best thought of as indicators of the general magnitude of these costs and not as precise measures.

Second, there are several significant aspects of the burden of alcohol problems that are not captured in these estimates. Perhaps most important, alcohol problems exact a heavy toll in terms of human suffering. Failed marriages, anguished families, stalled careers, criminal records, and the pain of loved ones killed or disabled from alcohol-related causes are aspects of this suffering that cannot be accounted fully in a COI framework. In addition, secondary effects of alcohol problems on economic market outcomes are not reflected in estimates of the economic cost of alcohol abuse. For example, worries about alcohol-related crime and motor vehicle crashes may induce people to spend more on security and safety measures than they otherwise would, and these costs are not counted in the COI framework. Similarly, alcohol problems are known to contribute to workplace accidents and absenteeism, thereby increasing the cost of labor to businesses, with potential effects on total employment and production over and above the effects on individuals' productivity. The overall magnitude of such secondary economic consequences of alcohol problems is unknown, but the aggregate effect could be substantial.

Third, estimates of the economic costs of alcohol abuse reflect only adverse consequences. However, in addition to generating the large costs described above, alcohol consumption also confers some benefits. Most obviously, many people value the enjoyment they obtain from consuming alcoholic beverages. Evidence for this includes purchasers' decisions to spend $94.5 billion on alcoholic beverages in 1997 (Putnam and Allshouse 1999), in the process generating $18.2 billion in Federal, State, and local tax revenues (Distilled Spirits Council of the United States 1999). In addition, evidence is accumulating that moderate consumption of alcoholic beverages is associated with certain health benefits (see the section "Measuring the Health Risks and Benefits of Alcohol" in the first chapter of this report). In part because COI studies do not consider any benefits associated with alcohol consumption, estimates of the economic costs of alcohol abuse, such as those presented in the recent report by Harwood and colleagues, should not be interpreted as indicators of the net loss to society resulting from use of alcoholic beverages.

Finally, estimates of the economic costs of alcohol abuse—however large they may be—do not provide sufficient information by themselves to justify the use of any particular policies that might be suggested as ways to reduce those costs. Any specific policy intended to reduce the adverse consequences of alcohol consumption must be evaluated in terms of the costs and benefits associated with that particular policy. The tools of cost-benefit analysis and cost-effectiveness analysis can be used as frameworks to evaluate the impact that a particular policy might have on reducing the costs of alcohol abuse, and how expensive it would be to achieve that impact.

In light of these limitations, COI studies may be most useful at the initial stage of the policy development process. Estimates of the various components of the economic costs of alcohol abuse can help direct attention to the most costly adverse consequences of alcohol consumption. Scientists, clinicians, and policy makers can use this information in their search for strategies to address these problems.

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