Estimates of Economic Costs of Alcohol and Drug Abuse and Mental Illness, 1985 and 1988

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Synopsis

The high prevalence of alcohol and drug abuse and mental illness imposes a substantial financial burden on those affected and on society. The authors present estimates of the economic costs from these causes for 1985 and 1988, based on current and reliable data available from national surveys and the use of new costing methodology.

The total losses to the economy related to alcohol and drug abuse and mental illness for 1988 are estimated at $273.3 billion. The estimate includes $85.8 billion for alcohol abuse, $58.3 billion for drug abuse, and $129.3 billion for mental illness.

The total estimated costs for 1985, $218.1 billion, include $51.4 billion for direct treatment and support costs; $80.8 billion for morbidity costs, the value of reduced or lost productivity; $35.8 billion for mortality costs, the value of foregone future productivity for the 140,593 premature deaths associated with these disorders, based on a 6 percent discount rate and including an imputed value for housekeeping services; and $47.5 billion in other related costs, including the costs of crime, motor vehicle crashes, fire destruction, and the value of productivity losses for victims of crime, incarceration, crime careers, and caregiver services. The cost of acquired immunodeficiency syndrome associated with drug abuse is estimated at $1 billion, and the cost of fetal alcohol syndrome is estimated at $1.6 billion.

The estimates may be considered lower limits of the true costs to society of alcohol and drug abuse and mental illness in the United States.

ALCOHOL ABUSE, DRUG ABUSE, AND MENTAL ILLNESS (ADM) are major causes of widespread illness, disability, and premature death in the United States.

The burden on society of these disorders encompasses the costs of the use of medical resources; losses of productivity; and the financial consequences of motor vehicle crashes, fire destruction, and criminal activity resulting in destruction of property and in incarceration. Victims of these disorders experience pain and suffering. They may be forced into economic dependence, homelessness, social isolation, unwanted job changes, loss of opportunities for promotion and education, and other disruptions in life plans. Families and friends of victims are affected and often their lives are disrupted.

ADM disorders impose a substantial burden on those directly affected as well as society in general. While quantifying all aspects of the burden is difficult, translating the burden into economic terms is important to facilitate formulating policy about use of resources and in making decisions.

Because resources are limited, continued rises in health care expenditures and growing pressures for cost containment may constrain the amounts available to provide all Americans with needed health care. Priorities need to be placed where there is likely to be the greatest improvement in welfare or well being per dollar spent. To determine the

expenditures for research, prevention, education, treatment, and control of ADM disorders, it is necessary to quantify the burden that they place on society as well as the cost and effectiveness of alternative interventions.

We developed estimates of the economic burden of ADM disorders for 1985 as part of an earlier, larger study, "The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985," (*1*) conducted for the National Institute on Drug Abuse (NIDA). In this report we summarize the methods and sources of data used to estimate the direct and indirect costs of ADM disorders for 1985 and present the results, together with newly available limited data for 1988.

Sources of Data and Method

Cost of illness studies are typically divided into two major categories, core costs, or those resulting directly from the illness, and other related costs, which are the costs of secondary, nonhealth effects of illness. Within each category, there are direct and indirect costs. Direct costs are those for which payments are actually made. Indirect costs are those for which resources are lost. Indirect costs consist of morbidity and mortality costs. Morbidity costs are the value of productivity lost by those unable to perform their usual activities or unable to perform at full effectiveness because of the illness. Mortality costs are the value of productivity lost because of premature death from illness. Lost productivity is calculated as the present discounted value of future market earnings, plus an imputed value for housekeeping services.

The human capital approach was used in this study. According to this approach, a person is seen as producing a stream of output that is valued at market earnings or the imputed value of housekeeping services. The approach is based on a social perspective and has the advantage of using data that are reliable and readily available. The approach yields low values for children and the retired elderly because the value of human life is based on market earnings, and pain and suffering are not taken into account.

In this study, prevalence-based costs were used to estimate the costs of ADM. This method provides an estimate of the direct and indirect economic burden incurred during the base period as a result of the prevalence of illness during the period, usually 1 year. Included was the cost of base year manifestations or associated disability with onset in the base year or at any time prior.

Definition of ADM. ADM disorders are defined as any of the following diagnoses from the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) (*2*). A detailed listing of ICD-9-CM ADM diagnoses is contained in appendix A of the full report (*1*).

Alcohol abuse includes alcohol psychoses, dependence, acute alcoholic hepatitis, cirrhosis of the liver, fetal alcohol syndrome, accidental poisoning by alcoholic beverages, and others.

Drug abuse includes drug psychoses and dependence, narcotics and hallucinogenic agents affecting fetus or newborn, poisoning by drugs, and others.

Mental illness includes psychoses; neurotic, personality, and other nonpsychotrophic mental disorders; depression; suicide; and others.

Estimating the economic costs of mental illness is a complex process involving methods and sources of data that are described in detail in the full report. This section briefly summarizes the models used for estimating the costs of ADM for 1985 by type of cost.

Direct costs. In general, direct costs (medical expenditures) were estimated as the product of two components, which are the number of services and the unit prices or charges. For example, short-stay hospital days of care were based on data from the National Hospital Discharge Survey for 1984 through 1986 (*3*), accessed through public use data files. Included in direct costs were the annual average days of care associated with a primary diagnosis of ADM and the additional days of care (by age and sex) reported for secondary or comorbid ADM disorders. Expenses per patient day (*4*) were applied to the days of care to obtain total short-stay hospital costs.

Nursing home costs were estimated by multiplying the number of residents diagnosed with a primary or secondary ADM disorder at admission times the annual charge for all residents in the 1985 National Nursing Home Survey (*5*). Costs of outpatient care by office-based physicians were based on visit data from the 1985 National Ambulatory Medical Care Survey (*6, 7*), and charges to psychiatrists and other physicians obtained from the American Medical Association (*8*).

Several categories of ADM costs were obtained in discussions with staff members of organizations with relevant data. The costs of other office-based professional services were limited to psychologists and social workers, derived from data provided by the American Psychological Association and the American Council of Social Workers. Expenditures

for care in ADM specialty institutions were estimated from information provided by the Department of Veterans Affairs, the Department of Defense, and the PHS's Indian Health Service and National Institute of Mental Health (*9*).

Expenditures for psychotropic prescription drugs included amounts spent for minor tranquilizers, antidepressants, antipsychotics, and combination drugs. The expenditures were based on national estimates of outpatient prescription sales from the National Prescription Survey, conducted by the Pharmaceutical Data Services (*10*).

Support costs related to the treatment of ADM disorders included Federal expenditures for medical and health services research, training costs for physicians and nurses, program administration, and the net cost of private health insurance. These costs were based on sources that included the Budget of the United States (*11*), financial statements of medical and nursing schools (*12, 13*), and the Health Care Financing Administration (*14*).

Other related direct costs included those for the public and private criminal justice system, motor vehicle crashes, property destruction, and social welfare administration. For each component, the costs attributed to ADM disorders were estimated, employing the offense-specific methodology developed by Cruze and coworkers (*15*), and Harwood and coworkers (*16*), in which causal factors that represent the proportion of offenses or arrests considered to be due to ADM disorders are applied to the number of known offenses, and multiplied by the costs per offense. These data were obtained from the Department of Justice (*17–20*); the Bureau of the Census (*21*); the Department of Transportation, National Highway Traffic Safety Administration, Office of Plans and Policy; and the Office of Management and Budget (*22*). The estimating procedure is described in detail in appendix D of the full report (*1*).

Administrative expenditures for public social welfare programs included the old age, survivors, and disability insurance component of Social Security; unemployment insurance; railroad and State temporary disability insurance programs; workers compensation; public assistance; supplemental security income; food stamps; veterans' pensions and rehabilitation; and vocational rehabilitation. These were estimated by applying ADM illness-specific causal factors to social welfare expenditures (*23*).

Morbidity costs. Morbidity costs for the noninstitutionalized population, the value of reduced or lost productivity due to ADM, were estimated as the product of the number of persons affected, multiplied by the average income loss per person from ADM. Each of these terms was further divided into two parts. The number of persons with ADM disorders was the size of the reference population multiplied by the ADM prevalence rates. The average income loss per person with an ADM disorder was the percentage loss due to the disorder per person, multiplied by the average income level the person would have attained had he or she not been affected by this disorder. Each of these terms was disaggregated by age, sex, and disorder. Summing this four-term product over age, sex, and ADM disorder provided an estimate of the aggregate loss of income from mental illness among the entire population.

A timing model was developed in the estimation of impairment rates (percent of income loss), which were applied to average incomes, including an imputed value of housekeeping services, by age and sex. Maximum likelihood estimation was employed to estimate impairment rates, based on a model that measures the lifetime effect on current income of persons with these disorders, taking into account the timing and duration of the mental disorders. Timing and duration were based on measures of time of onset and time of last symptom, relative to the time of interview in the Epidemiologic Catchment Area Surveys (*24*). Multiplying the impairment rates by average incomes yielded measures of the annual income loss per person with the disorder by age, sex, and disorder. The estimating procedure is described in detail in appendices B and C in the full report (*1*).

ADM disorders are not neatly segregated among prevalent persons. Drug abusers often abuse alcohol, and conversely, and both types of substance abusers have higher than average rates of mental illness (*25–31*). All income losses from these disorders were distributed among the three categories. The prevalence of multiple disorders in a person presents the problem of how to allocate income loss attributable to multiple disorders among the disorders present. This problem was addressed by first determining if measurable interaction effects of overlapping disorders were identifiable. In initial regression studies, multiple diagnostic variables were included to determine if overlapping prevalence introduced additional income loss (beyond that found from first-order prevalence measures).

Because of the colinearity introduced by these additional variables, however, discerning such effects statistically was not possible. As a result, the analysis was based on the assumption that the

effects of overlapping prevalence are additive, but not interactive. The impairment rate found for mental illness was the same whether it was a sole disorder or in the presence of alcohol abuse or drug abuse.

Morbidity costs for the noninstitutionalized population were based on the number of residents in State and county mental hospitals ("Additions and Resident Patients at End of Year, State and County Mental Hospitals, by Age and Diagnosis, by State, United States, 1985," administrative document, National Institute of Mental Health, Division of Biometry and Applied Sciences, January 1988) and the number of residents with mental disorders in nursing homes (*5*). The number of institutionalized persons was adjusted by labor force participation rates, and multiplied by the estimated mean earnings adjusted for wage supplements for each age and sex group.

Mortality costs. Mortality costs are the value of productivity lost from premature deaths resulting from ADM disorders. If a person had not died prematurely, he or she would have continued to be productive for a number of years. The estimated mortality costs are the product of the number of deaths and the expected value of a person's future earnings, with sex and age taken into account.

The estimate of lifetime earnings was based on varying labor force participation rates. The assumption is that people will be working and productive during their expected lifetime in accordance with the current pattern of work experience for their sex and age group.

Productivity losses were based on annual mean earnings by age and sex, adjusted for wage supplements, such as employer contributions for social insurance, private pensions, and welfare funds. Cross-sectional profiles of mean earnings by age and sex were employed to estimate lifetime earnings (*32*). In applying these data, we assumed that the future earnings of an average person within a sex group would follow the pattern reported by the U.S. Bureau of Census (*33*) during a base year. The average person may expect his or her earnings to rise with age and experience, in accordance with the cross-sectional data for that year. A discount rate of 6 percent was used to convert the stream of lifetime costs into present value equivalent. An average annual increase of 1 percent in the future productivity of wage earners was assumed.

Marketplace earnings underestimate the loss resulting from ADM disorders because many persons are not in the labor force. Many of them, as well as those in the labor force, perform household services. The value of household work, therefore, must be added to earnings. For this study, estimates were developed of hours spent on household labor, employing regression analysis to control for socioeconomic and demographic factors (*34*). The hours were valued on the basis of 1985 wage rates.

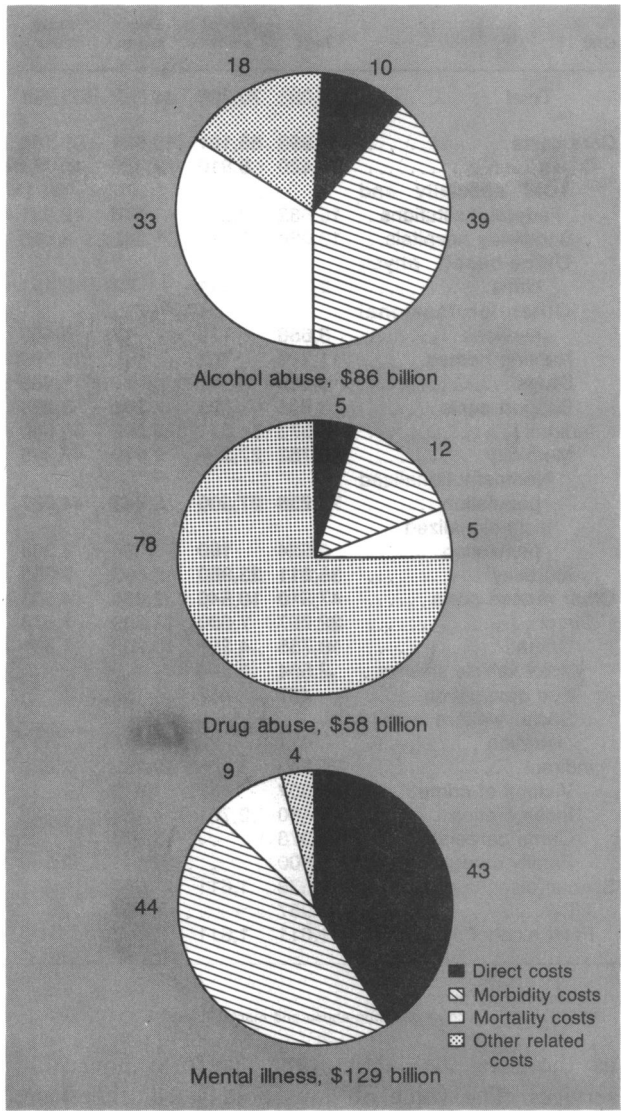
Table 1. Economic costs of alcohol and drug abuse and mental illness, 1985 (dollars in millions)

Cost	Total	Alcohol abuse	Drug abuse	Mental illness
Total	218,081	70,338	44,052	103,691
Core costs	167,993	58,181	10,624	99,188
Direct	51,420	6,810	2,082	42,528
ADM specialty and Federal institutions	15,682	2,281	570	12,831
Short-stay hospitals	13,064	3,017	1,242	8,805
Office-based physicians	2,344	141	52	2,151
Other professional services	3,656	173	17	3,466
Nursing homes	11,286	703	...	10,583
Drugs	1,453	...	...	1,453
Support costs	3,935	495	201	3,239
Indirect	116,573	51,371	8,542	56,660
Morbidity	80,762	27,388	5,979	47,395
Noninstitutionalized population	77,238	27,208	5,943	44,087
Institutionalized population	3,524	180	36	3,308
Mortality[1]	35,811	23,983	2,563	9,265
Other related costs	47,510	10,546	32,461	4,503
Direct	22,267	7,380	13,209	1,678
Crime	18,755	4,251	13,203	1,301
Motor vehicle crashes	2,584	2,584	...	...
Fire destruction	457	457	...	...
Social welfare administration	471	88	6	377
Indirect	25,243	3,166	19,252	2,825
Victims of crime	1,307	465	842	...
Incarceration	7,460	2,701	4,434	325
Crime careers	13,976	...	13,976	...
Family caregiving	2,500	...	...	2,500
Special disease groups	2,578	1,611	967	...
AIDS	967	...	967	
Fetal alcohol syndrome	1,611	1,611	...	...

[1] Discounted at 6 percent.
NOTE: ADM = Alcohol and drug abuse and mental illness.

Other related indirect costs. Four types of costs were estimated, the cost of persons incarcerated in prisons as a result of conviction for an ADM-related crime, the cost of victims of crime, the cost of crime careers, and the value of time spent to care for family members with a mental illness. The first were based on the number of persons incarcerated (*35, 36*), multiplied by 1985 average, year-round, full-time mean earnings adjusted for supplements and fringe benefits. Data on persons criminally victimized were from the National Crime

Figure 1. Economic costs of alcohol and drug abuse and mental illness, by type of cost, 1988, in percentages



Survey (*20*). Lost productivity of people engaged in criminal activity as a result of drug abuse were from the National Narcotics Intelligence Consumers Committee (*37*).

The value of time spent by caregivers for care provided to mentally ill family members was estimated by Franks in a study conducted for the National Institute of Mental Health (NIMH) (*38*). Included were time spent in caregiving; loss of work; time spent with lawyers, clergy, and other professionals; recreation; and other activities. The estimate was based on a survey of the total membership of the Massachusetts Alliance for the Mentally Ill, a family support and advocacy group.

Special disease groups. The costs of two diseases associated with alcohol and drug abuse were estimated, acquired immunodeficiency syndrome (AIDS) and fetal alcohol syndrome (FAS). The cost of AIDS was based on the proportion (20 percent) that the number of intravenous drug users represented of total AIDS cases in 1985, as reported by Centers for Disease Control, applied to the total direct and indirect cost of AIDS in 1985, estimated by Scitovsky and Rice (*39*). FAS costs were based on Abel and Sokol's review of the literature on incidence rates and their estimate of annual treatment costs (*40*).

Cost estimates for 1988. The costs of ADM were updated to 1988 employing economic data and indexes with known relationships to the mental illness cost estimates. To obtain the 1988 values, both inflationary and real changes were taken into account. Direct costs were adjusted using the percentage change in the components of total personal health care expenditures between 1985 and 1988. These data incorporate inflation in the medical care market as well as the effect of changing demographics and patterns of health care utilization.

For indirect costs, inflation and real change were estimated separately. The change in hourly compensation in the business sector was used to reflect real change for morbidity. The change in the total number of deaths was used to reflect real change for mortality. Similarly, for other related crime expenditures, the Gross National Product implicit price deflator for government purchases of goods and services was used to reflect inflation, and the change in the number of arrests was used for real change.

Results

Recent surveys document the high prevalence of ADM disorders in the population. Regier and coworkers reported 1-month, 6-month, and lifetime prevalences of ADM disorders from the NIMH Epidemiologic Catchment Area Surveys program (*25*). Of the population 18 years of age and older, 15.4 percent fulfilled criteria for at least one alcohol, drug abuse, or other mental disorder during the 1-month period before the interview and 32.2 percent during their lifetime.

The 1985 National Household Survey on Drug Abuse sponsored by NIDA found that 62 million persons (32.4 percent of the population) used marijuana and hashish during their lifetime, and 22.2 million (11.6 percent) used cocaine. Marijuana and hashish users during the year amounted to 29.4

million (15.3 percent), and 12.2 million (6.3 percent) used cocaine during the past year (*41*).

The 1984 National Alcohol Survey conducted by the Alcohol Research Group, under grant support from the National Institute of Alcohol Abuse and Alcoholism, reported that 18 percent of all men and 5 percent of all women were classified as frequent drinkers; 6 percent of all male drinkers and 2 percent of all female drinkers reported they got drunk as often as once a week or more (*42*).

This high prevalence of ADM disorders results in high use of medical care services and considerable costs to society in productivity losses.

Total economic impact. ADM disorders imposed a $218.1 billion burden on the United States economy in 1985 (table 1). Using a variety of economic and health factors, the total economic cost of ADM was an estimated $273.3 billion for 1988.

The distribution of total economic costs by type of illness or disorder shows that the greatest costs in 1988 were for mental illness, $129.3 billion, or 47 percent; alcohol abuse, $85.8 billion, or 31 percent; and drug abuse, $58.3 billion, or 21 percent (figure 1).

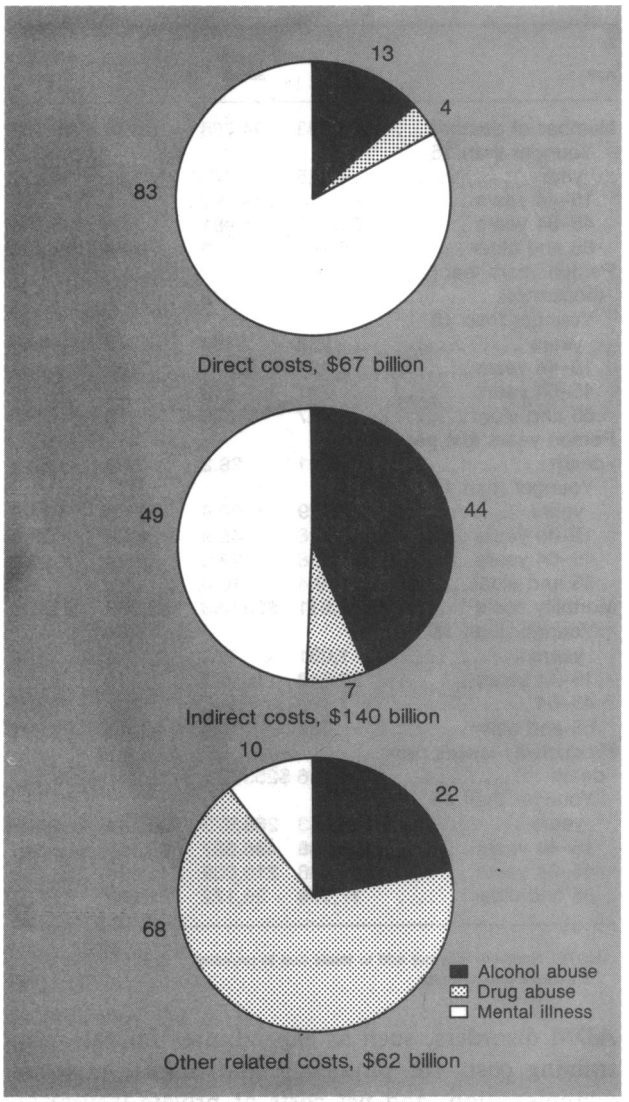
Direct treatment and support costs for the three disorders comprised 24 percent of the total for 1988. Morbidity costs, the value of reduced or lost productivity, were 36 percent. Mortality costs were 16 percent, based on a 6-percent discount rate of the value of productivity foregone in future years as a result of premature mortality in 1988. Other related costs were 23 percent, and they included crime expenditures, motor vehicle crashes, fires, and the value of productivity lost by victims of crime, through incarceration, from crime careers, and by care givers. The cost of AIDS and fetal alcohol syndrome wee 2 percent of the total.

Variations in the distribution by type of cost among the three disorders reflected differences in prevalence, medical care use, morbidity and mortality patterns, and other related costs for each disorder. Of the $85.8 billion for alcohol abuse, the greatest portion was for morbidity costs, $38 billion, or 39 percent.

Of the total economic costs for drug abuse of $58.3 billion, other related costs (including the cost of AIDS) comprised the highest amount, $45.4 billion, or 78 percent. Morbidity costs accounted for almost half (44 percent) of the total $129.3 billion cost for mental illness.

The distribution by disorder of the total economic costs of ADM for each type of cost showed considerable variation (figure 2). Mental illness

Figure 2. Economic costs of alcohol and drug abuse and mental illness, by type of cost and disorder, 1988, in percentages



comprised more than four-fifths (83 percent) of the total ADM direct costs of $67 billion; 13 percent was for alcohol abuse, and 4 percent was for drug abuse. Of total indirect costs, 49 percent was for mental disorders, 44 percent for alcohol abuse, and 7 percent for drug abuse. Drug abuse comprised the largest share, 68 percent, of other related costs; 22 percent was for alcohol abuse, and 10 percent for mental illness.

Direct costs. Direct costs included the amounts spent in 1985 for personal health care for persons suffering from ADM disorders, including hospital and nursing home care, physician and other professional services, and prescription drugs. Included were support costs related to the treatment of

Table 2. Number of deaths from alcohol and drug abuse and mental illness, person years lost, and lost productivity costs, by age, 1985 (dollars in millions)

Age	Total	Alcohol abuse	Drug abuse	Mental illness
Number of deaths	140,593	94,768	6,118	39,707
Younger than 15 years	4,055	2,675	61	1,319
15–44 years	53,150	34,192	4,568	14,390
45–64 years	34,640	26,981	865	6,794
65 and older	48,745	30,916	624	17,205
Person years lost (in thousands)	3,955	2,675	231	1,049
Younger than 15 years	283	184	4	95
15–44 years	2,424	1,571	199	654
45–64 years	791	610	22	158
65 and older	457	309	6	142
Person years lost per death	28.1	28.2	37.8	26.4
Younger than 15 years	69.9	68.9	71.5	71.9
15–44 years	45.6	45.9	43.6	45.4
45–64 years	22.8	22.6	25.4	23.3
65 and older	9.4	10.0	10.2	8.2
Mortality costs [1]	$35,811	$23,983	$2,563	$9,265
Younger than 15 years	1,031	712	14	305
15–44 years	26,543	16,981	2,326	7,236
45–64	7,400	5,667	209	1,524
65 and older	837	624	13	201
Productivity losses per death	$254,716	$253,071	$418,857	$233,337
Younger than 15 years	254,153	265,973	236,244	231,007
15–44 years	499,398	496,637	509,194	502,849
45–64 years	213,638	210,039	241,696	224,363
65 and older	17,178	20,172	21,106	11,655

NOTE: Numbers may not add to totals due to rounding.
[1] 6 percent discount rate.

ADM disorders, such as expenditures for research, training costs for physicians and nurses, program administration, and net costs of private insurance.

Direct expenditures for medical treatment and support for all ADM disorders amounted to $51.4 billion, 24 percent of the total ADM economic costs. More than four-fifths of the $51.4 billion was for care of the mentally ill, owing to the high prevalence of mental illness requiring hospital, medical, and institutional care. About 31 percent of the direct costs, $15.7 billion, was expenditures for (*a*) care in specialty institutions (State, county, and psychiatric hospitals, residential treatment centers for emotionally disturbed children, free-standing mental health centers, and correctional facilities); and (*b*) care given by Federal providers (Department of Veterans Affairs, Department of Defense, and the Public Health Service's Indian Health Service.)

Expenditures for care of ADM patients in short-stay hospitals amounted to $13.1 billion, one-quarter of total direct costs. Of the $13.1 billion, $10.2 billion was the cost of care for patients representing 1.9 million hospital discharges, who used 22.1 million days of care associated with a primary ADM diagnosis. The remaining $2.9 billion was the estimated comorbidity cost for the 2.2 million discharges with a secondary ADM diagnosis. On the average, these patients stayed 2.84 days longer than those without ADM diagnoses.

Other treatment costs included $2.3 billion for office-based physicians and $3.7 billion for other professional services, including psychologists and social workers. Nursing home expenditures, mainly for the mentally ill, amounted to $11.3 billion, 22 percent of the direct costs. Prescription drugs were estimated at $1.5 billion, 3 percent of the direct costs.

The final component of the direct costs of mental illness was support costs, including expenditures for research, training costs of physicians and nurses, program administration, and the net cost of private health insurance. Support costs were estimated at $3.9 billion, 8 percent of direct costs.

Morbidity costs. Morbidity costs are the value of goods and services not produced in 1985 because of ADM disorders. Included are the value of reduced and lost productivity for the total civilian population suffering from ADM disorders. Total morbidity costs amounted to $80.8 billion for 1985. These included $47.4 billion, or 59 percent, for mental illness; $27.4 billion, or 34 percent, for alcohol abuse; and $6.0 billion, or 7 percent, for drug abuse.

Costs for the noninstitutionalized population amounted to $77.2 billion and accounted for 96 percent of the total morbidity costs. Costs for institutionalized persons amounted to $3.5 billion. Costs for persons with mental illness comprised 94 percent of the total. This high proportion is accounted for by the large number of residents with mental disorders in mental hospitals and nursing homes, compared with persons institutionalized for the other two disorders.

Mortality costs. Mortality costs are the present value of lifetime earnings lost by all who died in 1985 as a result of ADM disorders. The cost is the number of ADM deaths multiplied by the expected value of future earnings, with sex and age taken into account. This method takes into consideration life expectancy at the age of death, changing patterns of earnings at successive ages, varying

labor force participation rates, imputed value for housekeeping services, and a 6 percent discount rate to convert aggregate earnings over a lifetime to their present worth. Mortality costs are shown in table 2, and lifetime earnings are shown in table 3.

In 1985, 140,593 people died from ADM disorders, 94,768 died from alcohol abuse, 39,707 died from mental illness, and 6,118 deaths were attributed to drug abuse. Those deaths are included for which the underlying cause was coded as alcohol abuse, drug abuse, or mental illness. For alcohol abuse, alcohol-related deaths were included in which alcohol was implicated as a contributing cause of death. For example, about half the deaths from motor vehicle traffic collisions, two-fifths of the deaths from falls and fires and burns, and three-tenths of drownings were estimated to involve alcohol. Almost all suicides (87 percent) were classified as mental illness suicides; the remaining 13 percent were classified as alcohol-related deaths. These 140,593 deaths resulted in almost 4 million person-years lost, or 28 years per death. Those deaths represented a loss of $35.8 billion to the economy at a 6 percent discount rate, or $254,716 per death.

For the 94,984 men who died from ADM disorders, an estimated 2.8 million person years were lost, 29 years per death, valued at $28.6 billion, or $301,566 per death. The 45,608 women who died represented a loss of 1.2 million years, or 26 years per death. Because of the fewer deaths and lower earnings of women, losses were significantly lower than for men, amounting to a total of $7.2 billion, or $157,145 per death. Thus, men accounted for 68 percent of the ADM deaths, 70 percent of the person years lost, and 80 percent of the productivity losses for 1985.

Many people who die of ADM disorders are relatively young; 38 percent of the victims are ages 15–44 years. The total of years of life lost for this age group, a function of both age and number of deaths, represented 61 percent of the person-years lost to ADM disorders. In terms of lost earnings, this age group accounted for 74 percent of the total. By contrast, 35 percent of ADM deaths were persons 65 years of age and older, accounting for 12 percent of person-years lost and only 2 percent of productivity losses. ADM deaths comprised 7 percent of the 2.1 million deaths in the United States in 1985, 12 percent of the total person-years lost and 20 percent of the total productivity losses. ADM deaths are a disproportionatly larger share of deaths in the younger age groups. ADM deaths comprised almost half, 46 percent, of all deaths of persons aged 15–24 years, and 30 percent of deaths of persons aged 25–44.

Table 3. Present value in dollars of lifetime earnings, by age and sex, 1985 [1]

Age	Males	Females
Younger than 1 year	208,631	173,738
1–4 years	236,117	196,515
5–9 years	293,977	244,559
10–14 years	374,790	311,678
15–19 years	468,782	384,026
20–24 years	541,021	425,804
25–29 years	568,546	424,982
30–34 years	565,043	402,176
35–39 years	532,289	364,873
40–44 years	471,190	319,090
45–49 years	389,462	268,529
50–54 years	294,646	214,826
55–59 years	194,878	159,614
60–64 years	101,085	105,272
65–69 years	39,713	61,103
70–74 years	17,802	33,574
75–79 years	8,789	17,531
80–84 years	4,457	8,655
85 and older	1,408	2,257

[1] Based on a 6 percent discount rate.

Other related costs. Other related costs include costs indirectly related to the treatment of and productivity lost by persons with ADM disorders. Costs include direct costs of crime, motor vehicle crashes, social welfare program administrative costs, and costs associated with the destruction of property by fire. Indirect other related costs include the value of productivity losses for victims of crime, incarceration, crime careers, and time spent to care for family members because of their mental illness.

Other related direct and indirect costs were estimated at $47.5 billion for 1985. Of this total, direct costs accounted for $22.3 billion (47 percent) and indirect costs for the remaining $25.2 billion (53 percent). Drug abuse costs comprised the largest share of the total of other related costs, $32.5 billion, or 68 percent. Alcohol abuse costs were $10.5 billion (22 percent). Mental illness costs amounted to $4.5 billion (9 percent).

Of the $22.3 billion in other related direct costs, 84 percent were related to crime. The remaining 16 percent included the value of losses due to motor vehicle crashes, fire destruction, and social welfare program administration costs associated with ADM.

The $25.2 billion in other related indirect costs was $1.3 billion in lost work time by victims of crime; $7.5 billion in productivity losses for persons incarcerated in prisons as a result of convic-

Figure 3. Core costs of alcohol and drug abuse and mental illness, by age and sex, 1985, in percentages

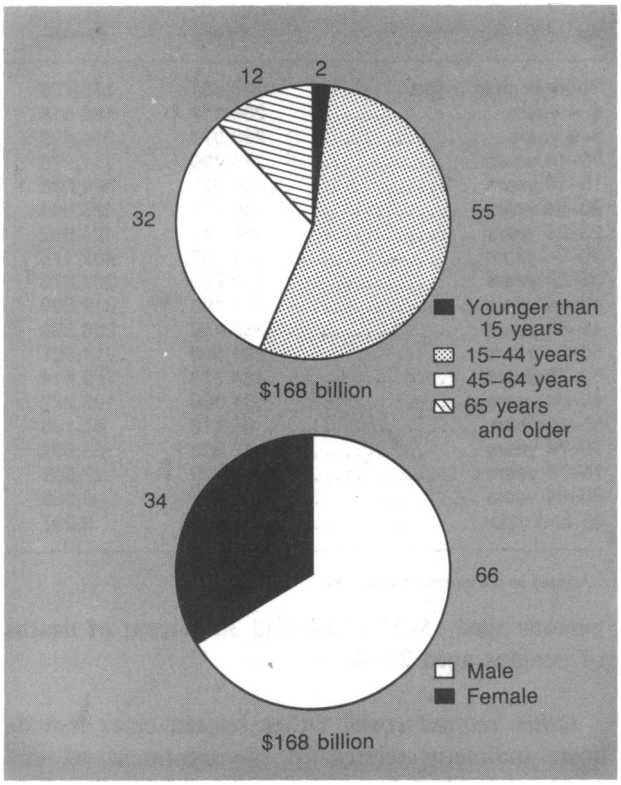


Table 4. Core[1] costs of alcohol and drug abuse and mental illness, by age and sex, 1985 (dollars in millions)

Sex and age	Total	Alcohol abuse	Drug abuse	Mental illness
Total	167,993	58,181	10,624	99,188
Younger than 15 years [2]	2,996	796	98	2,102
15–44 years	91,904	34,934	7,216	49,754
45–64 years	53,065	19,997	3,015	30,053
65 years and older	20,026	2,455	295	17,276
Male	111,019	46,995	6,953	57,071
Younger than 15 years [2]	1,891	539	57	1,295
15–44 years	66,211	28,767	4,977	32,467
45–64 years	35,802	16,352	1,792	17,658
65 and older	7,115	1,337	127	5,651
Female	56,973	11,186	3,671	42,116
Younger than 15 [2]	1,105	257	41	807
15–44 years	25,693	6,167	2,239	17,287
45–64 years	17,263	3,645	1,223	12,395
65 years and older	12,911	1,118	168	11,625

[1] Includes direct and indirect costs resulting directly from the illness.

[2] The younger than 15 years age group includes costs for 15–17-year-old persons for several cost categories (including ADM specialty institutions and Federal providers); thus, the costs for the younger then 15 years age group are overstated, and the costs for the 15–44 years age group are correspondingly understated.

NOTE: ADM = alcohol, drug abuse, and mental health. Numbers may not add to totals due to rounding.

tion for ADM-related crimes; $14 billion in estimated losses for those who engaged in crime as a career rather than legal employment; and $2.5 billion as the value of time spent to care for family members because of their mental illness.

Costs by sex and age. Only the core costs were distributed by sex and age. Core costs, $168 billion, included amounts spent directly related to the treatment and support of persons with ADM disorders as well as the morbidity and mortality indirect costs associated with these disorders. The total core economic costs of ADM for men were twice those for women, $111 billion compared with $57 billion (table 4). The significantly higher costs for men reflect their higher ADM prevalence, labor force participation rates, and earnings.

The 15–44-year-age group accounted for the largest share of core costs, 55 percent, followed by the 45–64-year-age group, which accounted for 32 percent of the total (figure 3). The 15–44-year-age group comprised 68 percent of the drug abuse core costs and 60 percent of the alcohol abuse core costs, reflecting the high prevalence of drug and alcohol abuse and the larger number of deaths in this age group.

Source of payment. The direct costs of mental illness, distributed by source of payment and treatment setting, are shown in table 5 and figure 4. Private sources accounted for 44 percent of the total direct expenditures for treatment of persons with ADM disorders; 56 percent was borne by public sources, almost equally divided between Federal, State, and local sources.

There was considerable variation in sources of payment by treatment setting. All of the expenditures in Federal provider treatment settings (Department of Veterans Affairs, Department of Defense, and the Public Health Serivce's Indian Health Service) are paid entirely from Federal funds. Not surprisingly, more than four-fifths of the State and county psychiatric hospitals and other institutions (residential treatment centers for emotionally disturbed children, freestanding facilities, multi- source mental health organizations, and correctional facilities) are supported by State and local funds.

In contrast, three-fourths of payments for care in private psychiatric hospitals came from private sources. Of expenditures for short-stay hospital care of patients with ADM disorders, 41 percent came from Federal sources, 16 percent from State and local funds, and the remaining 43 percent from private sources. Almost half (49 percent) of the expenditures for nursing home care came from

public sources, with 28 percent from Federal funds, and 21 percent in State and local payments.

For outpatient care in private physicians' offices, for other professional services, and for drugs, private funds covered the bulk of the expenditures, 90 percent of the total.

Discussion

A variety of ADM cost studies have been conducted during the past three decades, as shown in table 6. As expected, the costs have risen during the years. More important, however, is the considerable variation among studies in the distribution of direct and indirect costs and in the level of costs in studies for the same years. These variations are from the use of different methodologies, estimating procedures, sources of data, and discount rates. For example, the effects of direct and indirect costs of mental illness have been changing, with a dramatic increase in direct costs relative to indirect costs. Rice and coworkers estimated that the indirect costs of mental illness were twice the direct costs in 1963 (*43*).

Employing the same methodology, direct costs had increased so rapidly by 1980 that the relationship between the two types of costs was reversed, with direct costs almost twice the indirect costs, reflecting the high rate of inflation in medical care costs and lower rates of increase in wages over the 17-year period (*44*).

The cost estimates presented in this study were based on the most current and reliable data available, using new methodology developed specifically for the study. Nevertheless, several qualifications are in order. Several known costs were excluded because data were unavailable. No estimates were made for ADM illnesses income loss among the transient (homeless) and military populations, resulting in underestimation of costs. Some of the cost estimates are likely to be low because of data limitations. For example, hospital discharge data records may not list ADM diagnoses because of the stigma associated with this disorder. To compensate for the probable omission of hospitalization of some patients with these disorders, we used average expense per patient day in all non-Federal community hospitals, applied to the reported days of care, to obtain total hospital costs. Since most mental illness short-stay hospital episodes do not involve surgery, the average expense per day for these patients is probably less than for the average patient, which is likely to overestimate the costs.

Estimates of income loss among the civilian noninstitutionalized resident population were calculated only for the population ages 18 to 64 years. To the degree that those younger than 18 years and those older than 64 years suffered earnings losses because of ADM illnesses, the costs were understated. Productivity losses were based on personal income rather than on personal earnings. Personal income, which includes receipt of transfer payments, may be less sensitive to the effects of ADM disorders than personal earnings, resulting in possible understatement of costs.

A 6 percent discount rate was used to estimate the present value of future earnings lost. Use of a lower discount rate would yield higher mortality costs. Using the 6 percent discount rate results in understatement of mortality costs.

Full-time, year-around earnings for the civilian noninstitutionalized population and average life

Figure 4. Core direct costs for alcohol and drug abuse and mental illness, by source of payment, 1985, in percentages

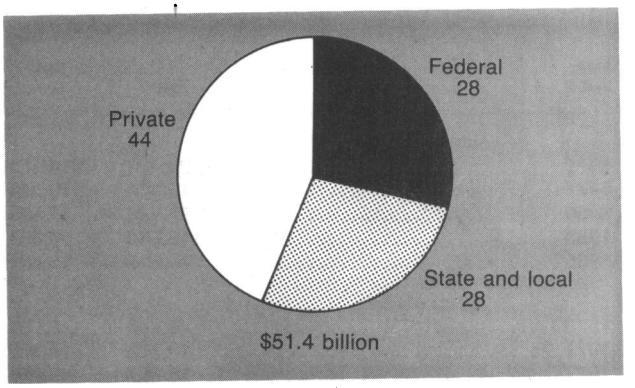


Table 5. Direct costs of alcohol and drug abuse and mental illness, by treatment setting and source of payment, 1985 (dollars in millions)

Treatment setting	Total	Federal	State and local	Private [1]
Total	51,420	14,365	14,576	22,479
ADM specialty and Federal institutions	15,682	4,229	9,520	1,933
Federal providers	2,273	2,273	...	...
State and county psychiatric hospitals	5,661	821	4,585	255
Private psychiatric hospitals	1,888	285	189	1,414
Other ADM institutions	5,860	850	4,746	264
Other treatment costs	31,803	8,888	4,754	18,161
Short-stay hospitals	13,064	5,304	2,123	5,637
Office-based physicians	2,344	165	59	2,120
Other professional services	3,656	256	91	3,309
Nursing homes	11,286	3,092	2,404	5,790
Drugs	1,453	71	77	1,305
Support costs	3,935	1,248	302	2,385

[1] Includes private health insurance, direct payments by patients, and philanthropy.

NOTE: ADM = Alcohol and drug abuse, and mental illness.

Table 6. Alcohol and drug abuse and mental illness cost studies, percent distribution of costs, and source of the information (dollars in millions)

Study period	Total	Direct costs	Indirect costs		Percent distribution		Reference source
			Amount	Discount rate	Direct	Indirect	
Alcohol abuse							
1971	$ 29,428	$14,559	$14,869	6	49.5	51.5	45
1977	49,374	10,813	38,561	6	21.9	78.1	15
1980	89,526	17,953	71,573	6	20.1	79.9	16
1983	116,674	23,861	92,810	6	20.5	79.5	16
1985	70,338	15,801	54,537	6	22.5	77.5	1
Drug abuse							
1973	9,749	8,222	1,527	10	84.3	15.7	46
1974–75	10,338	4,932	5,406	NA	47.7	52.3	47
1977	16,387	6,066	10,321	6	37.0	63.0	15
1983	59,747	9,294	50,453	6	15.6	84.4	16
1985	44,052	15,481	28,571	6	35.1	64.9	1
Mental illness							
1954	3,649	1,723	1,926	4	47.2	52.8	48
1963	7,277	2,402	4,875	4	33.0	67.0	43
1968	20,000	4,000	16,000	NA	20.0	80.0	49
1971	25,237	11,058	14,179	5	43.8	56.2	50
1972	13,917	6,985	6,932	4	50.2	49.8	51
1974	36,786	16,973	19,813	5	46.1	53.9	52
1975	18,201	9,411	8,790	2.5	51.7	48.3	53
1977	40,287	18,745	21,542	6	46.5	53.5	15
1980	54,236	25,288	28,948	6	46.2	53.4	16
1980	30,685	19,824	10,861	4	64.6	35.4	44
1983	72,775	35,501	37,274	6	48.8	51.2	16
1985	103,691	44,206	59,485	6	42.6	57.4	1

expectancy were used in the estimates of foregone earnings. These measures should be adjusted to reflect earnings and life expectancy without ADM disorders, but data were not available to make adjustments, thereby introducing a downward bias into the estimates.

For these reasons, the cost estimates presented in this report can be interpreted as a lower limit of the true cost of ADM illnesses. As better data become available, the approach can be refined and improved.

Conclusions

The measurable economic costs of ADM are high, amounting to $218.1 billion in 1985 and an estimated $273.3 billion for 1988. We estimated the costs of alcohol abuse in 1988 at $85.8 billion, the costs of drug abuse at $58.3 billion, and the costs of mental illness at $129.3 billion (*1*). Clearly, the greatest costs were for mental illness. There were variations in the distribution by type of cost among the three disorders, reflecting differences in prevalence, medical care use, morbidity patterns, and other related costs for each disorder.

In 1988, morbidity costs accounted for 44 percent of the total costs for mental illness and 38 percent for alcohol abuse. For drug abuse, however, morbidity costs comprised only 12 percent of the total, and other related costs were 72 percent of the total.

Each year in the United States an estimated 1.9 million persons are hospitalized with a primary ADM diagnosis in short-stay hospitals, and 2.2 million are hospitalized with a secondary ADM diagnosis. More than 110,000 persons reside in mental hospitals, 646,000 persons are in nursing homes, and 33.5 million visits are made to office-based physicians. More than 140,000 deaths are attributed to ADM disorders, representing almost 4 million person-years lost, or 28.1 years per death, and productivity losses of $255,000 per death. More than 232,000 person-years are served in prisons for crime and offenses associated with ADM.

In the light of these high costs, more attention must be directed at comprehensive, research-based strategies to reduce ADM disorders in the United States. Special attention should be given to improvement of data collection, analysis, and evaluation to provide reliable and timely information for policy use. These expanded data efforts will enable the conduct of research studies to better estimate the economic costs to society of ADM disorders.

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A National Survey of State Maternal and Newborn Drug Testing and Reporting Policies

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Synopsis

The prevalence rate of drug use by pregnant women in the United States has been shown to range from 7.5 percent to 11 percent. Drug exposure in utero has been associated with deleterious effects on the fetus and newborn. Public health officials are currently confronted with difficult policy decisions with regard to testing and reporting of pregnant and post-partum women and the provision of appropriate services. The widespread lack of consistent policy on the State level has led to bias in testing and reporting procedures and to the inappropriate use of the legal system as a deterrent to drug use during pregnancy.

A survey of the 50 States and the District of Columbia found that no State currently has enacted legislation regarding testing. Thirteen States have mandatory reporting policies for drug-exposed newborns. Eleven of these States require reporting to social service agencies, at least 3 States routinely report to criminal justice agencies, and 10 require that reports be filed as child abuse or neglect. Many States without mandatory reporting statutes indicate that reports are made to social service agencies at the discretion of the health care provider. During fiscal year 1990, only 22 States specifically allocated funds for programs that address perinatal substance use.

In States with mandatory reporting policies, reports should be made only to social service agencies in conjunction with the provision of appropriate preventive, medical, and social services to the woman and her infant. Interagency coordination is necessary to standardize testing and reporting practices within States and to effectively allocate resources.