

ECONOMIC COSTS
OF ALCOHOL AND
DRUG ABUSE IN
TEXAS - 1989



Texas Commission on
Alcohol and Drug Abuse

BRINGING TEXAS A NEW VIEW OF HUMAN POTENTIAL.

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TEXAS - 1989**

Liang Y. Liu, Ph.D.

Texas Commission on Alcohol and Drug Abuse

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Texas Commission on Alcohol and Drug Abuse
9001 North IH-35, Suite 105
Austin, Texas 78753-5233
(512) 349-6600, (800) 832-9623
Web site: www.tcada.state.tx.us

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CHAPTER I - SUMMARY

1.1 INTRODUCTION

Abuse of alcohol and illicit drugs is one of the most important public health problems facing our society today. Dependence on alcohol and illicit drugs creates adverse social and personal consequences such as physical suffering, personal degradation, reduced productivity at work, accidental injuries and fatalities, acts of violence, and fragmented families.

The consequences of alcohol and drug abuse are financially significant, not only in terms of direct health care costs, but also in terms of lost earnings due to reduced productivity and premature death, crime-related costs, and costs incurred from diseases related to substance abuse. The present study quantifies these consequences and estimates the monetary loss that resulted from the misuse of alcohol and illicit drugs in Texas in 1989. Although previous research has identified the major contexts of alcohol and drug abuse that incur "opportunity costs" to society (i.e., the value of the foregone benefits because the resource is not available for its best alternative use), assigning specific dollar amounts for Texas estimates is complicated due to a lack of certain state-level data. In addition, it is difficult to establish cause and effect, such as in the relationship

between substance abuse and criminal behavior. These difficulties demonstrate that although the economic costs of alcohol and drug abuse can be estimated, costs cannot be directly measured. Nevertheless, a careful analysis of cost estimates can give us an idea of the dimensions of the problem and can assist in the development of social policy regarding the prevention, treatment, and control of alcohol and drug abuse.

The research methodology used in determining the cost of substance abuse to Texans involves a complex set of variables, and the ways in which data are analyzed are constantly being refined and updated. Estimates of the costs of substance abuse have been made by the federal government using data from 1977, 1980, and 1985, and costs have been estimated for Texas using data from 1981 and 1984. The present study, using 1989 Texas data, can be viewed as the "third generation" of cost studies. Each study utilized the most up-to-date and reliable data possible, as well as the most specific and refined methodology available at that time for cost estimations. For example, the 1989 Texas study included estimates of the cost of IVDU-related AIDS and perinatal drug exposure, which are two phenomena that were not

included in the 1984 Texas estimates. In the future additional cost categories will be identified, and previously-included categories will be defined differently. For example, future studies will most likely show an increase in crack-related violent crimes, a phenomenon that is beginning to be documented in the literature. For these reasons, the estimates for 1989 given in this report cannot be directly compared to previous Texas estimates; consequently, any differences between current and previous estimates do not necessarily reflect actual cost changes.

Rather than trying to pinpoint trends in substance abuse costs over the years, it is more important to recognize the enormity of these costs in any given year, to understand what different institutions and activities contribute to that overall figure, and to comprehend fully the dramatic effect that substance abuse has on the life of every Texan.

1.2 1989 TEXAS ECONOMIC COSTS: GENERAL RESULTS

The methodology for this study has been adapted in part from a national study by Rice and associates (1990). The general results of the economic impact are highlighted below.

Impact of Substance Abuse on Texas

■ Substance-related deaths accounted for more than one-third (35.3 percent) of

all deaths among 15- to 24-year-olds in 1989.

■ About 41 percent of state prison inmates and 47 percent of local correction inmates in 1989 were held for crimes that involved substance use.

■ In 1989 there were about 1.96 million noninstitutionalized adult Texans with alcohol and/or illicit drug problems. Among these problem users, about one-third (32.5 percent) were young adults aged 18-24.

■ 7,922 Texans died in 1989 from causes related to alcohol and drug abuse .

■ One-third of the total expenditures of the criminal justice system is associated with alcohol and drug abuse.

■ About 46 percent of all arrests in Texas are related to alcohol and/or illicit drugs.

■ Nearly one-half (46 percent) of all homicides in Texas involve alcohol abuse.

■ One-quarter of all property crime involves drug use, and about 13.2 percent of violent offenses involve drug use.

■ 45 percent of fires, 42 percent of motor vehicle accidents, 38 percent of

drownings, and 28 percent of suicides involve alcohol abuse.

■ Of the approximately 5,246 Texans alive with AIDS in 1989, about 9 percent (467) were intravenous drug users. Of the approximately 1,449 Texans who died from AIDS in 1989, about 8 percent (113) had been intravenous drug users.

■ Of the 1,853 hepatitis B cases in Texas in 1989, an estimated 25 percent (456) were intravenous drug users. Of the 61 people who died from hepatitis B in 1989, about 30 percent (18) had been intravenous drug users.

Economic Cost Overview

■ The total economic cost of substance abuse in Texas was approximately \$12.6 billion in 1989 (Table 1.1).

■ Alcohol abuse cost \$7.9 billion (62.7 percent), illicit drug abuse cost \$3.7 billion (29.0 percent), and the combined category of “alcohol and drug abuse” cost \$1.0 billion (8.3 percent) (Figure 1.1). The combined “alcohol and drug abuse” category includes costs due to individuals having both alcohol and illicit drugs problems, and cannot be separated into either alcohol abuse or drug abuse.

■ Morbidity costs (the value of lost productivity) account for 44.7 percent of total economic costs, “other related costs”

(crime expenditures, motor vehicle crashes, social welfare administration, fire damage, victims of crime, incarceration, and crime careers) account for 26.8 percent, and mortality costs (the loss of future lifetime earnings due to premature death) account for 18.9 percent (Figure 1.2).

■ Direct treatment costs account for 5.5 percent of the total substance abuse estimate, and costs for special disease groups such as AIDS related to intravenous drug use (IVDU), IVDU-related hepatitis B, and perinatal substance exposure account for 4.0 percent.

Economic Costs for Alcohol Abuse

■ Alcohol abuse cost Texans \$7.9 billion in 1989.

■ Of the total \$7.9 billion for alcohol abuse, \$4.3 billion (54.2 percent) is due to morbidity costs. This cost category estimates the reduced productivity for 1,472,543 problem drinkers aged 18 and over.

■ Treatment for alcohol addiction cost \$268 million in Texas in 1989, which is 3.4 percent of the total alcohol abuse costs.

■ Mortality costs due to alcohol addiction amount to \$2.0 billion, which is 25.9 percent of the total alcohol abuse costs. During 1989, 7,210 persons in

Table 1.1
 Economic Costs of Alcohol and Drug Abuse by Type of Cost
 Texas, 1989

Type of Cost	Amount (\$ in millions)			
	Total	Alcohol Abuse	Drug Abuse	Combined Alc&Drug Abuse
Total	\$12,590	\$7,889	\$3,654	\$1,047
Core Costs	\$8,710	\$6,586	\$1,137	\$987
Treatment	\$695	\$268	\$428	--
Morbidity (lost productivity)	\$5,632	\$4,272	\$373	\$987
Mortality (premature death)*	\$2,383	\$2,046	\$337	--
Other Related Costs	\$3,372	\$949	\$2,422	\$0.4
Direct (CJ system, property loss, legal defense, MV crashes)	\$1,705	\$737	\$967	\$0.4
Indirect (victims of crime, crime careers, incarceration)	\$1,667	\$212	\$1,455	--
Specific Disease Groups	\$508	\$353	\$95	\$59
AIDS	\$56	--	\$56	--
Hepatitis B	\$14	--	\$14	--
Perinatal Substance Exposure	\$438	\$353	\$26	\$59

Type of Cost	Percent Distribution (%)			
	Total	Alcohol Abuse	Drug Abuse	Combined Alc&Drug Abuse
Total	100.0	100.0	100.0	100.0
Core Costs	69.2	83.5	31.1	94.3
Treatment	5.5	3.4	11.7	--
Morbidity (lost productivity)	44.7	54.2	10.2	94.3
Mortality (premature death)*	18.9	25.9	9.2	--
Other Related Costs	26.8	12.0	66.3	0.0
Direct (CJ system, property loss, legal defense, MV crashes)	13.5	9.3	26.5	0.0
Indirect (victims of crime, crime careers, incarceration)	13.2	2.7	39.8	--
Specific Disease Groups	4.0	4.5	2.6	5.7
AIDS	0.4	--	1.5	--
Hepatitis B	0.1	--	0.4	--
Perinatal Substance Exposure	3.5	4.5	0.7	5.7

* 4 percent discount rate.

FIGURE 1.1 ALCOHOL AND DRUG ABUSE COSTS BY DISORDER
 TEXAS, 1989 (TOTAL: \$12.6 BILLION)

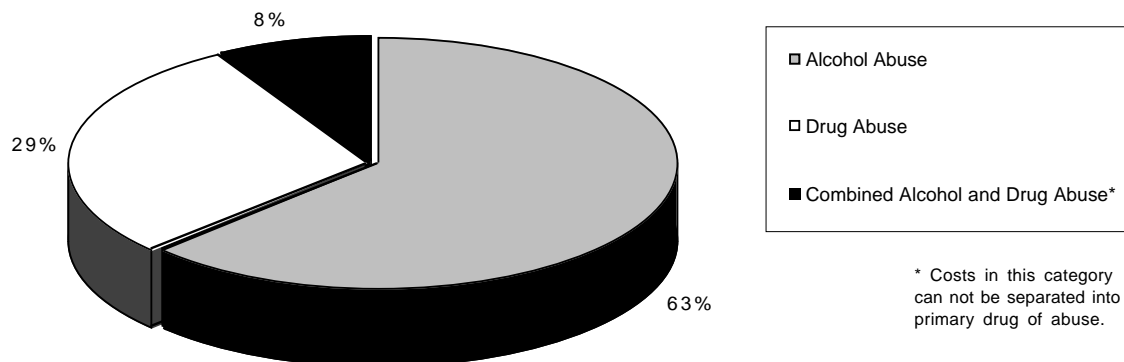
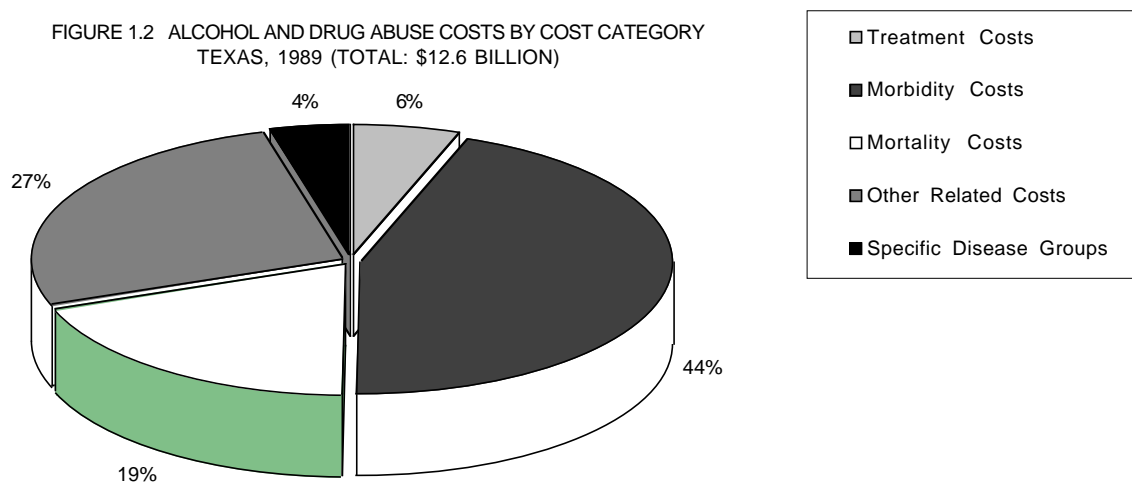


FIGURE 1.2 ALCOHOL AND DRUG ABUSE COSTS BY COST CATEGORY
 TEXAS, 1989 (TOTAL: \$12.6 BILLION)



Texas died from alcohol disorders, which translates to 231,279 years of potential life lost (32.08 years per death) and the equivalent of \$2.0 billion in lost future earnings (\$283,805 per death).

■ “Other related costs” account for 12.0 percent (\$949 million) of the total alcohol abuse costs; this category consists of crime-related expenditures, motor vehicle crashes, social welfare administrative costs, fire losses, productivity losses due to incarceration, and lost productivity for victims of crime related to alcohol abuse.

■ The economic costs for perinatal alcohol exposure were estimated at \$353 million in Texas in 1989 — \$131 million for 584 infants with fetal alcohol syndrome (FAS) and \$222 million for 53,451 alcohol-exposed (but non-FAS) infants.

Economic Costs for Drug Abuse

■ Drug abuse cost Texans \$3.7 billion in 1989.

■ “Other related costs” account for 66.3 percent (\$2.4 billion) of the total drug abuse costs; this category consists of crime-related expenditures, motor vehicle crashes, social welfare administrative costs, fire losses, productivity losses due to incarceration, and lost productivity for victims of crime related to drug abuse. The estimated opportunity costs due to drug

users engaged in criminal careers rather than legal employment are approximately \$1.1 billion.

■ Treatment for drug addiction cost \$428 million, which is about 12 percent of total drug abuse costs.

■ Morbidity costs due to illicit drug addiction are \$373 million, which is 10.2 percent of the total drug abuse costs. These costs estimate the reduced productivity for 193,669 adult Texans (aged 18 and over) with drug dependency.

■ Mortality costs due to drug abuse total \$337 million, which is 9.2 percent of the total drug abuse costs. About 712 deaths in Texas in 1989 were attributed to drug abuse, which translates to 30,512 years of potential life lost (42.84 years per death) and \$337 million in productivity losses (\$472,522 per death).

■ The costs of perinatal illicit drug exposure (\$26 million), AIDS associated with intravenous drug use (\$56 million), and hepatitis B associated with intravenous drug use (\$14 million) total \$95 million, which is 2.6 percent of the total drug abuse costs.

Economic Costs for Combined Alcohol and Drug Abuse

■ The combined alcohol and drug abuse category accounts for \$1.0 billion,

which is 8.3 percent of the total substance abuse economic costs. This category includes costs incurred by individuals with both alcohol and illicit drug problems which cannot be separated into alcohol abuse or drug abuse. About \$987 million of the cost is related to morbidity, and about \$59 million is from perinatal exposure to alcohol and illicit drugs.

■ A small part (\$424,000) of the total combined alcohol and drug abuse costs is attributed to motor vehicle crashes. It is estimated that the numbers of fatalities and non-fatal injuries due to combined alcohol and drug abuse in motor vehicle crashes were 10 and 28, respectively.

Economic Costs by Category Type

■ Morbidity costs account for \$5.6 billion (44.7 percent) of total substance abuse costs. This estimate is based on the total 1,963,834 noninstitutionalized population aged 18 and over who have alcohol and/or illicit drug problems.

■ Alcohol and drug abuse take their toll most heavily among young adults: substance-related deaths account for 35.3 percent of all deaths among those aged 15-24, and 27.4 percent of all deaths among those aged 25-34. Of the 7,922 substance-related deaths in 1989, about 13 percent were 15-24 years old, 16 percent were 25-34 years old, and 13 percent were 35-44 years old.

■ Premature mortality accounted for \$2.4 billion (18.9 percent) of the total substance abuse costs. Mortality costs represent the present value of lifetime earnings lost for individuals who died from alcohol and drug abuse. In 1989, 7,922 Texans died from alcohol and drug disorders (7,210 alcohol and 712 drug), which translates to 261,791 years of potential life lost (33.05 years per death) and a loss of \$2.4 billion to the economy (\$300,779 per death).

■ Treatment costs account for \$695 million, which is 5.5 percent of the total costs of substance abuse. Of the total treatment costs, two-thirds are spent by the private for-profit institutions. The private non-profit institutions account for 25.2 percent of the total treatment expenditures, state and local government providers 7.8 percent, and federal providers 0.3 percent (Figure 1.3).

■ Crime-related costs — including maintenance of the criminal justice system, drug traffic control, private legal defense, and property destruction — account for \$1.3 billion, which is about 11 percent of total substance abuse costs. The largest component of these crime-related costs is the criminal justice system (police protection, legal and adjudication, state correction, and local correction), which amounts to \$1.1 billion (Figure 1.4).

■ During 1989, an estimated 56,536 drug abusers in Texas engaged in crime careers to finance their drug addiction.

■ Incarceration associated with drug abuse translated to 12,273 person years in lost productivity in Texas in 1989; an additional 7,961 person years were lost due to incarceration related to alcohol abuse.

■ There were 905,166 total reported arrests in Texas in 1989 — of this total, 18.3 percent were from public drunkenness, 11.4 percent were from driving under the influence, 7.9 percent were from drug law violations, 2.6 percent were from liquor law violations, and 6.7 percent were from other substance-related arrests (Figure 1.5).

■ “Costs for specific disease groups” includes the costs of IVDU-related AIDS cases, IVDU-related hepatitis B cases, and perinatal substance exposure. The total estimated costs for these special disease groups in Texas in 1989 were \$508 million (\$438 million for perinatal alcohol and drug exposure, \$56 million for IVDU-related AIDS, and \$14 million for IVDU-related hepatitis B).

FIGURE 1.3 AMOUNT SPENT ON ALCOHOL AND DRUG ABUSE TREATMENT BY FACILITY TYPE, TEXAS, 1989 (\$ IN MILLIONS)

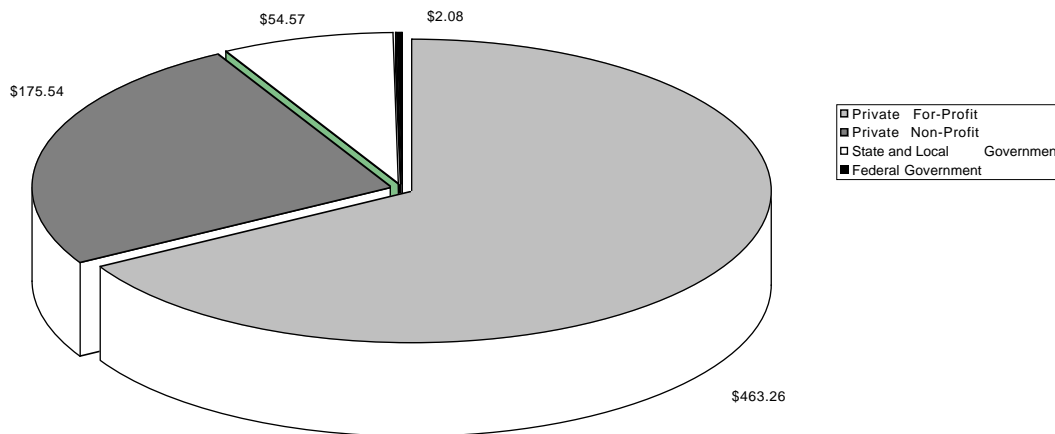


FIGURE 1.4 CRIME-RELATED COSTS DUE TO ALCOHOL AND DRUG ABUSE BY CATEGORY TEXAS, 1989 (TOTAL: \$1.3 BILLION)

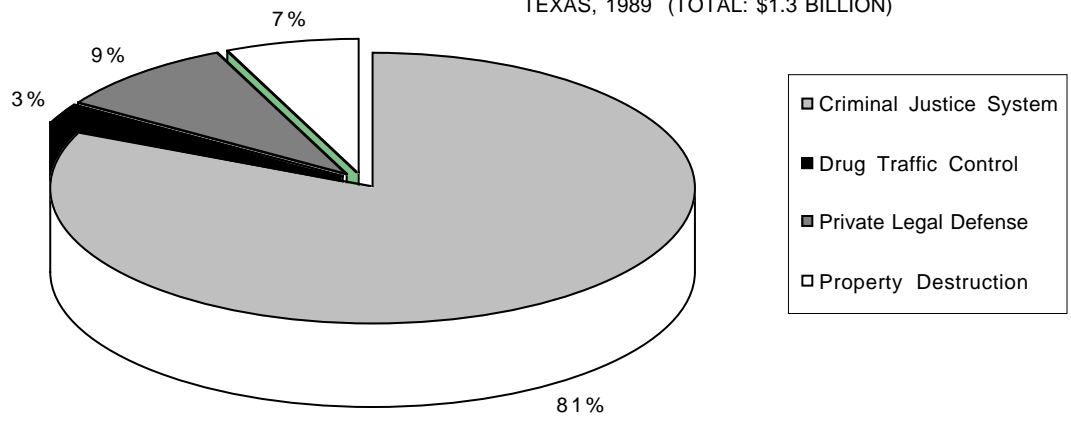
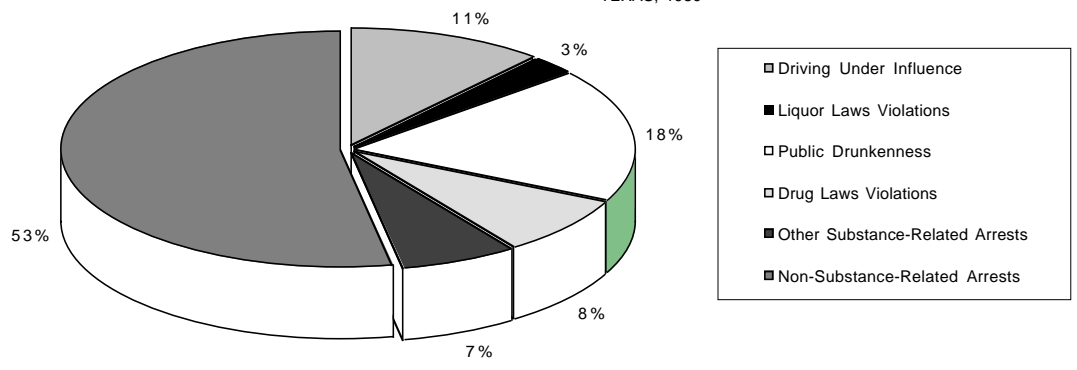


FIGURE 1.5 TOTAL KNOWN ARRESTS BY TYPE OF OFFENSE TEXAS, 1989



CHAPTER II - TREATMENT COSTS

Total treatment costs of substance abuse in Texas in 1989 were approximately \$695.5 million. Of this total amount, 38.5 percent (\$267.7 million) is attributed to alcohol abuse and 61.5 percent (\$427.7 million) to drug abuse. About 66 percent of the total treatment costs, or \$463.3 million, is expended in private for-profit institutions (Table 2.1). The private non-profit institutions account for 25.2 percent (\$175.5 million) of the total treatment expenditures, state and local government institutions account for 7.8 percent (\$54.6 million), and federal institutions account for 0.3 percent (\$2.1 million).

2.1 COMPUTATIONAL BASES AND DATA SOURCES

Direct estimates are available for treatment costs, and are derived by multiplying the number of active clients in treatment programs by the length of stay by the treatment fees per client per day/hour.

Number of Clients

The number of active clients in alcohol and drug abuse treatment programs in Texas was estimated on the basis of data supplied by the 1989 National Drug and

Alcoholism Treatment Unit Survey (NDATUS). NDATUS is the only comprehensive survey of both public and private-sector providers in the nation. Sponsored by the National Institute on Drug Abuse (NIDA) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA), it is administered in Texas by the Texas Commission on Alcohol and Drug Abuse (TCADA). In 1989, NDATUS data classified clients as receiving *either* alcohol or drug abuse treatment, and did not allow for clients to be classified as receiving *both* alcohol and drug abuse treatment. Data on the number of clients in alcohol or drug treatment programs were aggregated into two modality groups comprised of several services types. The two modalities are inpatient/residential programs and outpatient programs. For alcoholism clients, the inpatient service types are medical detoxification, social detoxification, rehabilitation/recovery, and custodial/domiciliary; the outpatient service type is rehabilitation/recovery. For drug abuse clients, both inpatient and outpatient programs include three types of care: detoxification, maintenance, and drug-free.

Table 2.1
 Total Treatment Costs by Treatment Unit Ownership and Disorder
 Texas, 1989

Treatment Unit Ownership	Amount (\$ in millions)		
	TOTAL	Alcohol Abuse	Drug Abuse
TOTAL	\$695.45	\$267.74	\$427.71
Private For-Profit	\$463.26	\$185.74	\$277.52
Private Non-Profit	\$175.54	\$58.44	\$117.10
State and Local Government	\$54.57	\$21.48	\$33.09
Federal Government	\$2.08	\$2.08	--

Treatment Unit Ownership	Percent Distribution (%)		
	TOTAL	Alcohol Abuse	Drug Abuse
TOTAL	100.0	100.0	100.0
Private For-Profit	66.6	69.4	64.9
Private Non-Profit	25.2	21.8	27.4
State and Local Government	7.8	8.0	7.7
Federal Government	0.3	0.8	--

Source: See Tables 2.2, 2.3 and 2.4.

According to NDATUS for Texas in 1989, 72 percent of the total clients were male; 50 percent were White, 27 percent Hispanic, and 17 percent Black; and 70 percent were between 21 and 44 years of age. The survey also found that on September 30, 1989, 58 percent of clients in alcoholism treatment were in outpatient services and 42 percent were in inpatient/residential care. Among the total drug abuse clients in treatment, 73 percent were receiving outpatient care; the remaining 27 percent were being treated in inpatient/residential settings.

The clients in treatment were also cross-classified by treatment unit ownership. NDATUS provided information for four types of treatment unit ownership: private for-profit, private non-profit, state and local government, and federal government. There were in total 538 treatment units (202 private for-profit, 261 private non-profit, 61 state and local government, and 14 federal government) in Texas in 1989, but only 308 treatment units responded to the survey, which is a response rate of 57 percent. Among total responses received, 108 responses were from private for-profit institutions, 127 responses were from private non-profit institutions, 59 responses were from state and local government institutions, and 14 responses were from federal institutions.

Per-Client Costs

The cost of treatment in residential and outpatient programs was estimated on a statewide basis for 1989. The unit of treatment on which cost projections were based for residential treatment is a day in residence, and the unit of treatment for outpatient treatment is a session (or an hour) in the treatment center. Treatment fees and average length-of-stay figures for private for-profit institutions were based on a telephone survey conducted by TCADA in March, 1991. The average cost per day for inpatient care in 1990 was \$480.23 per client (ranging from \$100 per day to \$850 per day). The average length of stay for inpatient treatment was 32.36 days per patient (ranging from 14 days to 135 days). For outpatient services in private for-profit institutions, the average cost in 1990 was \$53.2 per session per client (ranging from \$12.3 to \$100). The total outpatient fees for an average 6-week program was approximately \$2,463.

For private non-profit institutions, the treatment fees and length-of-stay per client were based on TCADA data regarding average length of stay and costs (TCADA 1990a). These data include information from treatment providers that are funded in whole or in part by TCADA. All data reflect 12 months of service activity in fiscal year 1989. The average cost per day

was \$72.61 for adult inpatient programs (ranging from \$22.66 per day for intermediate services to \$245.38 per day for medical detoxification) and the average length of stay was 30.57 days. For adolescent inpatient programs, the average treatment fee was \$117.73 per day (ranging from \$69.23 per day to \$260 per day) and the length of stay was approximately 47 days. The outpatient treatment cost was about \$37.38 per session for adults and \$61.25 per session for youths. Assuming a typical 6-week program for outpatient services in private non-profit institutions, and applying an average outpatient contact of 11.2 hours for adults and 7.3 hours for youths, the total outpatient fees were estimated at \$418.66 for adults and \$447.13 for youths. The total outpatient fees for private non-profit institutions were about one-fifth of those for private for-profit institutions.

Among 61 state and local treatment institutions, there are 23 community mental health centers. The average inpatient fees of the community mental health center (CMHC) are much lower than those of the non-CMHC (such as state and local charity hospitals, TYC facilities, state chest hospitals, and treatment programs operated by cities). According to treatment cost data from Texas (TCADA 1990a), the average cost per day was \$92.71 for CMHC adult

inpatient care and \$112.68 for CMHC adolescent inpatient care. The Texas Department of Mental Health and Mental Retardation provided the information for inpatient cost per bed day for substance abuse units in eight state mental hospitals for the eight-month period ending April, 1991. The average cost of \$151.41 was used as the inpatient treatment fee per client day for state and local non-CMHCs in 1990. It is assumed that the residential length of stay is 30.57 days, which equals the typical one-month program in private non-profit institutions.

The total 6-week outpatient treatment fees of the CMHC was estimated at \$476.78 for adults and \$477.13 for youths. The cost data of outpatient treatment for state and local non-CMHCs was adapted from those for private non-profit institutions.

2.2 TOTAL TREATMENT COSTS

The total treatment costs in Texas were approximately \$695.5 million in 1989 (\$267.7 million for alcoholism and \$427.7 million for drug abuse). Calculations of total treatment costs were based on a normal six-week counseling program for outpatient services, and inpatient counseling was assumed to occur daily. The estimates of treatment costs by treatment unit ownership are summarized in the following sections.

Private For-Profit Institutions

Table 2.2 presents the number of active clients reported in NDATUS for private for-profit institutions by age, disorder and type of care. Unit cost estimates of treatment services in private for-profit institutions for 1989 were derived from those for 1990. Adjusting those estimates by an inflation rate of 5.4 percent yields the 1989 unit cost estimates. In 1989 the average inpatient fee charged by Texas private for-profit institutions was \$455.63 per client day and the average 6-week outpatient program charged \$2,336.96 per client. According to the survey, the number of active clients in treatment on September 30, 1989, for alcohol abuse was about two-fifths of that for drug abuse. Most patients in treatment were in the 18-44 age group, the highest portion being 25-34 years of age.

Based on the survey responses, about \$99.4 million and \$148.5 million were spent in 1989 on private for-profit treatment services for alcohol abuse and drug abuse, respectively. However, only 108 private for-profit institutions responded to the 1989 NDATUS, which is only about 53.5 percent of all private for-profit institutions in Texas. Therefore, assuming the same profiles between the respondent and nonrespondent programs, the total annual treatment costs for 100

percent of the Texas private for-profit institutions are projected as \$185.7 million for alcohol abuse and \$277.5 million for drug abuse.

Private Non-Profit Institutions

According to the 1989 NDATUS, there were 2,066 active alcoholism clients in treatment on September 30, 1989, and 6,018 active drug abuse clients in treatment in Texas private non-profit institutions (Table 2.3). The largest number of clients (36 percent) were 25-34 years of age. The inpatient treatment fee per day in private non-profit institutions was \$117.73 for adolescents under age 18 and \$72.61 for adults aged 18 and over. About \$447.13 was charged for a 6-week outpatient program for adolescents and \$418.66 for adults.

Based on the survey responses, the private non-profit treatment costs are \$28.5 million for alcohol abuse and \$57.0 million for drug abuse. However, the response rate of private non-profit institutions in the 1989 NDATUS was only about 48.7 percent. Assuming the same profiles between respondent and non-respondent institutions, the total costs for 100 percent of the private non-profit treatment providers are projected as \$58.4 million for alcohol treatment and \$117.1 million for drug treatment.

Table 2.2
 PRIVATE FOR-PROFIT INSTITUTIONS
 NDATUS Alcohol and Drug Abuse Clients and Treatment Costs
 by Age, Disorder and Type of Care, Texas, 1989 *

NUMBER OF CLIENTS**				
Age	Alcohol Abuse		Drug Abuse	
	Inpatient	Outpatient	Inpatient	Outpatient
< 18	45	71	85	61
18-24	111	73	195	155
25-34	162	97	209	635
35-44	97	80	100	669
45-54	76	43	54	127
55-64	33	11	17	36
65+	21	7	13	14
Unknown	6	0	5	66
Total	551	382	678	1,763

TREATMENT COSTS (\$ in thousands) ***				
Age	Alcohol Abuse		Drug Abuse	
	Inpatient	Outpatient	Inpatient	Outpatient
< 18	\$7,483	\$1,439	\$14,135	\$1,236
18-24	\$18,459	\$1,479	\$32,428	\$3,141
25-34	\$26,941	\$1,965	\$34,757	\$12,866
35-44	\$16,131	\$1,621	\$16,630	\$13,555
45-54	\$12,639	\$871	\$8,980	\$2,573
55-64	\$5,488	\$223	\$2,827	\$729
65+	\$3,492	\$142	\$2,162	\$284
Unknown	\$998	\$0	\$831	\$1,337
Total	\$91,631	\$7,740	\$112,751	\$35,721

- Notes: * Based on the responses received in 1989 NDATUS. The response rate is about 53.5 % of all private for-profit units in Texas.
 ** The number of active clients in treatment as of September 30,
 *** Based on the average inpatient fee in 1989 of \$455.63 per client day and average length of stay of 32.36 days, and the average outpatient fee of \$2,336.96 for a 6-week treatment program p
- Sources: 1. 1989 National Drug and Alcoholism Treatment Unit Survey (NDATUS) for Texas, unpublished data (Texas Commission on Alcohol and Drug Abuse).
 2. Telephone survey for client fees, Texas Commission on Alcohol and Drug Abuse, March 1991.

Table 2.3
 PRIVATE NON-PROFIT INSTITUTIONS
 NDATUS Alcohol and Drug Abuse Clients and Treatment Costs
 by Age, Disorder and Type of Care, Texas, 1989 *

NUMBER OF CLIENTS **				
Age	Alcohol Abuse		Drug Abuse	
	Inpatient	Outpatient	Inpatient	Outpatient
< 18	11	48	64	225
18-24	194	177	407	894
25-34	244	330	595	1,746
35-44	204	234	243	1,048
45-54	135	85	75	290
55-64	49	36	15	62
65+	7	2	0	6
Unknown	64	246	91	257
Total	908	1,158	1,490	4,528

TREATMENT COSTS (\$ in thousands) ***				
Age	Alcohol Abuse		Drug Abuse	
	Inpatient	Outpatient	Inpatient	Outpatient
< 18	\$473	\$186	\$2,750	\$872
18-24	\$5,142	\$642	\$10,787	\$3,244
25-34	\$6,467	\$1,197	\$15,769	\$6,335
35-44	\$5,407	\$849	\$6,440	\$3,803
45-54	\$3,578	\$308	\$1,988	\$1,052
55-64	\$1,299	\$131	\$398	\$225
65+	\$186	\$7	\$0	\$22
Unknown	\$1,696	\$893	\$2,412	\$932
Total	\$24,246	\$4,213	\$40,543	\$16,485

- Notes: * Based on the responses received in 1989 NDATUS. The response rate is about 48.7 % of all private non-profit units in Texas.
- ** The number of active clients in treatment as of September 30, 1989.
- *** The average inpatient fee is \$72.61 per client day and the length of stay is 30.57 days for adults; and, they are \$117.73 and 47 days respectively for youths. The average 6-week outpatient fee is \$418.66 for adults and \$447.13 for youths.
- Sources: 1. 1989 National Drug and Alcoholism Treatment Unit Survey (NDATUS) for Texas, unpublished data (Texas Commission on Alcohol and Drug Abuse).
2. "Average Length of Stay/Client Report" and "Cost Report 1990," unpublished reports (Texas Commission on Alcohol and Drug Abuse).

State and Local Government Institutions

Fifty-nine of sixty-one state and local treatment institutions responded to the 1989 NDATUS, and the client data for the remaining two state hospitals are from the Texas Department of Mental Health and Mental Retardation. Of the total 61 state and local units, 23 are community mental health centers (CMHCs) and 38 are non-CMHCs. Table 2.4 presents the total number of active clients in treatment per day for all 61 state and local institutions, which include 74 clients with unknown age. More patients were in drug abuse treatment than in alcohol abuse treatment.

The CMHCs charged \$112.68 per client day for adolescent inpatient treatment and \$92.71 per client day for adult inpatient treatment in 1989. About \$447.13 was charged for a 6-week outpatient program for youths and \$476.78 for adults in CMHCs. Costs for the other inpatient units were based on costs reported by 8 state mental hospitals. Adjusting the 1990 inpatient fee of \$151.41 per client day by an inflation rate of 5.4 percent yielded the 1989 inpatient fee of \$143.65 per client day for non-CMHC substance abuse treatment. The average 6-week outpatient fee per client in non-CMHC state and local institutions (adapted from those in private non-profit institutions) was \$447.13 for youths and

\$418.66 for adults. The total annual treatment costs for all 61 Texas state and local institutions can be estimated at \$21.5 million for alcohol abuse treatment and \$33.1 million for drug abuse treatment.

Federal Institutions

NDATUS for Texas included information for all 14 federal institutions providing alcohol and drug abuse treatment in 1989. Among the 14 institutions, 6 units were associated with the Veterans Administration. The total amount of funding sources provided in the NDATUS represents the total treatment costs for federal units. All financial support for the federal treatment institutions was from federal funds, which amounted to \$2.1 million in 1989. This total amount was for alcohol abuse treatment only; the figure for drug abuse treatment was not available. Therefore, it is estimated that about \$2.1 million in Texas was spent to treat alcohol abuse in federal institutions.

Table 2.4
 STATE AND LOCAL GOVERNMENT INSTITUTIONS
 Total Alcohol and Drug Abuse Clients and Treatment Costs
 by Age, Disorder and Type of Care, Texas, 1989

NUMBER OF CLIENTS *				
Age	Alcohol Abuse		Drug Abuse	
	Inpatient	Outpatient	Inpatient	Outpatient
< 18	103	27	173	53
18-24	36	112	121	187
25-34	71	239	94	517
35-44	62	268	89	358
45-54	29	174	16	71
55-64	7	21	3	17
65+	0	10	0	1
Unknown * *	61	0	68	0
Total	369	851	564	1,204

TREATMENT COSTS (\$ in thousands) ***				
Age	Alcohol Abuse		Drug Abuse	
	Inpatient	Outpatient	Inpatient	Outpatient
< 18	\$5,401	\$105	\$9,026	\$205
18-24	\$1,757	\$460	\$6,065	\$751
25-34	\$3,072	\$961	\$4,594	\$2,044
35-44	\$2,879	\$1,093	\$4,369	\$1,391
45-54	\$1,390	\$710	\$783	\$271
55-64	\$330	\$84	\$139	\$64
65+	\$0	\$41	\$0	\$4
Unknown	\$3,198	\$0	\$3,379	\$0
Total	\$18,027	\$3,455	\$28,355	\$4,730

- Notes:
- * The number of active clients in treatment as of September 30, 1989.
 - ** Includes 74 clients from the two state hospitals, based on data from Texas Department of Mental Health and Mental Retardation.
 - *** Based on the average inpatient fee of \$143.65 per client day for non-CMHC, and of \$92.71 (adults) and \$112.68 (youths) for CMHC; and the average 6-week outpatient fee of \$418.66 (adults) and \$447.13 (youths) for non-CMHC, and of \$476.78 (adults) and \$447.13 (youths) for CMHC.
- Sources:
1. 1989 National Drug and Alcoholism Treatment Unit Survey (NDATUS) for Texas, unpublished data (Texas Commission on Alcohol and Drug Abuse).
 2. Data from Texas Department of Mental Health and Mental Retardation.
 3. "Cost Report 1990," unpublished data (Texas Commission on Alcohol and Drug Abuse).

CHAPTER III - MORBIDITY COSTS: LOST PRODUCTIVITY

Morbidity costs reflect the reduction in productivity of workers who are alcohol and drug abusers. These costs were estimated at \$5,632 million in 1989 and comprise 45 percent of total substance abuse costs in Texas. About 75.9 percent (\$4,272 million) of total morbidity costs are from alcohol abuse, 6.6 percent (\$373 million) from drug abuse, and 17.5 percent (\$987 million) from combined alcohol and drug abuse. About 82 percent (\$4,626 million) of the losses are attributed to males and 17.9 percent (\$1,006 million) to females. Over 73 percent of the costs occurs in the 25-54 age group (34.4 percent in the 25-34 age group and 39.4 percent in the 35-54 age group) (Figure 3.1).

Morbidity costs were estimated by measuring the number of substance-abusing workers for each age-sex group and the amount of reduced earnings per worker due to abuse, multiplying these two figures, and summing over all age-sex groups. Only prevalence for the noninstitutionalized population of Texas was used in this estimate because data for the institutionalized population were not available (only about 1 percent of Texans are in institutions, most of whom are there because of mental illness). Once the number of substance abusers was

ascertained, that number was then multiplied by the total income per person. The total income includes the mean annual earnings (earned income) in the labor market and the imputed value of housekeeping services. These total income figures were multiplied by the disorder- and gender-specific impairment rate, which represents the productivity loss due to substance abuse. The impairment rates were estimated by regressing income on various sociodemographic characteristics of labor force participants and various information regarding alcohol and drug abuse.

3.1 ALCOHOL AND DRUG PROBLEM USERS

Table 3.1 presents the number of noninstitutionalized adult Texans in 1989 by age group and sex. To obtain the age- and gender-specific population in 1989, the proportional method in projection was applied for the data based on the *Texas 1980 Census of Population* (U.S. Department of Commerce 1983) and *Texas Vital Statistics 1989* (Texas Department of Health 1990).

Table 3.2 shows the percentages and the number of alcohol and drug problem users by age, sex and disorder in Texas in

FIGURE 3.1A SUBSTANCE ABUSE MORBIDITY COSTS BY DISORDER, TEXAS, 1989 (TOTAL: \$5.63 BILLION)

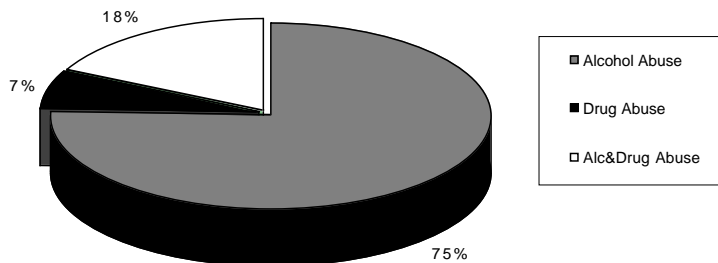


FIGURE 3.1B SUBSTANCE ABUSE MORBIDITY COSTS BY SEX, TEXAS, 1989 (TOTAL: \$5.63 BILLION)

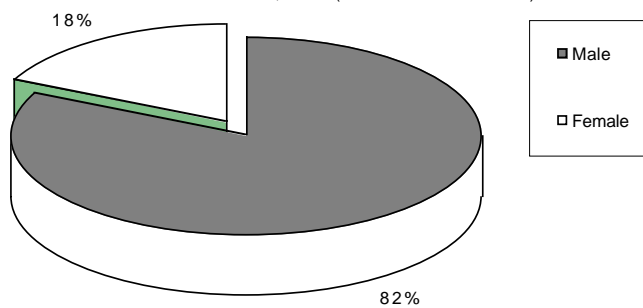


FIGURE 3.1C SUBSTANCE ABUSE MORBIDITY COSTS BY AGE, TEXAS, 1989 (TOTAL: \$5.63 BILLION)

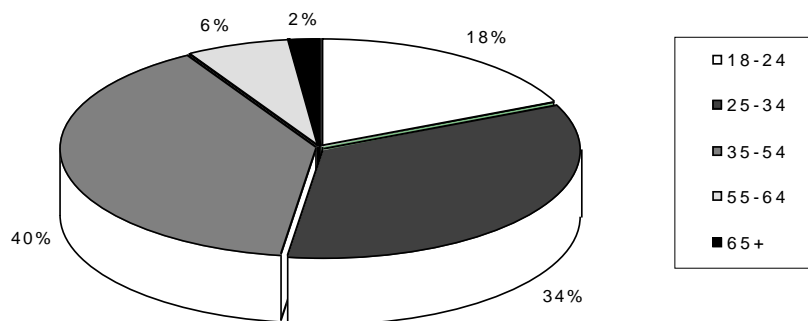


Table 3.1
Noninstitutionalized Population by Age and Sex, Texas, 1989

Age	Total	Male	Female
18-24	1,898,537	959,319	939,218
25-34	3,129,593	1,605,702	1,523,890
35-54	4,246,276	2,113,868	2,132,408
55-64	1,300,591	615,303	685,288
65+	1,621,617	679,112	942,505
Total	12,196,614	5,973,305	6,223,309

- Sources: 1. Detailed Population Characteristics, Texas 1980 Census of Population (U.S. Department of Commerce, Bureau of the Census).
2. Texas Vital Statistics 1989 (Texas Department of Health).
3. Data from the Bureau of State Health Data and Policy Analysis, Texas Department of Health.

1989. The prevalence of problems users was based on data collected for the TCADA Adult Survey (TCADA 1988a). The telephone interview survey, conducted by Texas A&M's Public Policy Resource Laboratory, generated a sample size of 5,156 adult Texans aged 18 and over. Texas households who had no telephones (approximately 10 percent of all households) were not sampled, nor were non-household populations such as the homeless and institutionalized. Because these sub-populations represent a small percentage of the general population, even large differences in substance use patterns of the non-household populations would make little change in estimates for the general population.

The number of problem substance users was determined by using a "problem measure." The TCADA Adult Survey asked 19 yes/no questions related to drinking problems and 17 yes/no questions associated with drug use problems. These questions, shown in Appendix B, were used to generate the percentages of alcohol and drug problem users and the statistical indicators for the regression analysis in the later section. A respondent is considered a problem drinker if he/she answered yes to 2 or more of the 19 alcohol-related questions; a respondent is considered a problem drug-user if he/she answered yes to any of the 17 drug-related problems. A respondent is considered *both* a problem drinker and drug-user if he/she answered yes to two or more of the drinking

Table 3.2
 Number of Alcohol and Drug Problem Users by Age, Sex and Disorder, Texas, 1989

	Percentages of Alcohol and Drug Disorder [1]		Number of Problem Users [2]		
	Male	Female	Total	Male	Female
Total			1,963,834	1,445,684	518,150
Alcohol Abuse			1,472,543	1,117,667	354,877
18-24	29.94%	15.16%	429,649	287,231	142,418
25-34	21.35%	7.59%	458,451	342,841	115,610
35-54	18.02%	4.21%	470,673	380,947	89,726
55-64	11.36%	1.04%	77,031	69,908	7,123
65+	5.41%	--	36,740	36,740	--
Drug Abuse			193,669	99,352	94,317
18-24	2.94%	5.02%	75,404	28,224	47,180
25-34	1.91%	1.83%	58,565	30,744	27,820
35-54	1.42%	0.62%	43,253	29,985	13,268
55-64	1.21%	0.52%	11,014	7,452	3,562
65+	0.43%	0.26%	5,434	2,946	2,487
Combined Alcohol and Drug Abuse			297,622	228,666	68,956
18-24	10.62%	3.33%	133,106	101,854	31,252
25-34	6.08%	1.22%	116,198	97,554	18,644
35-54	1.38%	0.89%	48,318	29,258	19,061
55-64	--	--	--	--	--
65+	--	--	--	--	--

Sources: [1] TCADA Adult Survey (Texas Commission on Alcohol and Drug Abuse).
 [2] Product of Table 3.1 and the percentages of alcohol and drug disorder.

questions *and* to any of the drug-related problems. To correct the instrument sampling error, the percentages of problem substance users were adjusted for the telephone/ethnic effect.

The youngest age group for both male and female adults had the highest percentage of substance-related problems: about 30 percent of males and 15 percent of females aged 18-24 were problem drinkers, and 3 percent of males and 5 percent of females aged 18-24 were problem drug-users. About 11 percent of males and 3 percent of females in the 18-24 age group were problem drinkers *and* problem drug-users. All of the percentages of problem substance-users decrease substantially with age.

The total estimated number of alcohol and drug abusers aged 18 and over in Texas in 1989 was 1,963,834. Of this total, 75 percent (1,472,543) were alcohol abusers, 10 percent (193,669) were drug abusers, and 15 percent (297,622) were both alcohol and drug abusers. Nearly all (93 percent) of substance abusers were between 18 and 54 years of age.

3.2 IMPAIRMENT FACTORS AND PER CAPITA INCOME LOSSES

Per capita income losses were generated by multiplying the total incomes per person by the impairment factors due

to alcohol and drug abuse. Total income levels per person include average annual earnings in the labor market and the imputed value of household services. Table 3.3 presents per capita income in 1989 for noninstitutionalized Texans aged 18 and over by age group and sex. The mean annual earnings per person are based on the *Texas 1980 Census of Population* (U.S. Department of Commerce 1983) and updated by the wage changes of 61.3 percent according to the Texas manufacturing average weekly earnings reported in *Texas Economic Indicators* (Bureau of Business Research 1988-1991). The earned income is the sum of wage/salary income and net income from farm and nonfarm self-employment. The earned income figures represent the amount of income received regularly before deductions for personal income taxes, social security, bond purchases, union dues, and medicare deductions. The 1989 average earned income was estimated at \$26,024 per male, compared to \$11,801 per female. For each age group, male earnings are substantially higher than female earnings. The highest amount of annual earnings for both males and females is in the 45-54 age group (Figure 3.2).

The imputed value of housekeeping services is presented in Table 3.3. This imputation has to be added to the earnings because many people keep house and do

Table 3.3
Per Capita Income in 1989 of Persons 18 Years and Over
by Age and Sex, Texas

Age and Sex	Total	Earned Income [1]	Imputed Value of Housekeeping Services [2]
Male	\$28,766	\$26,024	\$2,742
18-24	\$14,115	\$12,351	\$1,764
25-34	\$28,172	\$25,218	\$2,954
35-54	\$38,272	\$35,104	\$3,168
55-64	\$34,191	\$31,662	\$2,529
65+	\$18,560	\$17,220	\$1,340
Female	\$17,667	\$11,801	\$5,866
18-24	\$12,386	\$7,810	\$4,576
25-34	\$19,760	\$12,989	\$6,770
35-54	\$20,489	\$13,791	\$6,698
55-64	\$17,066	\$13,215	\$3,851
65+	\$10,511	\$8,528	\$1,983

Notes: [1] Earned income is the sum of wage or salary income and net income from farm and nonfarm self-employment. The figures are updated by the percentage change (61.3% increase) of Texas manufacturing average weekly earnings.

[2] Based on Rice and associates (1990) estimates. The values are reduced by 1.2% due to the lower average hourly earnings in Texas, and then updated by the percentage change (10.9% increase) of Texas average annual wages per employment in major industries.

Sources: 1. Detailed Population Characteristics, Texas 1980 Census of Population (U.S. Department of Commerce, Bureau of the Census).
2. Texas Economic Indicators (Bureau of Business Research, University of Texas at Austin), various issues.
3. Texas Labor Market Review (Texas Employment Commission, Economic Research & Analysis Department), various issues.

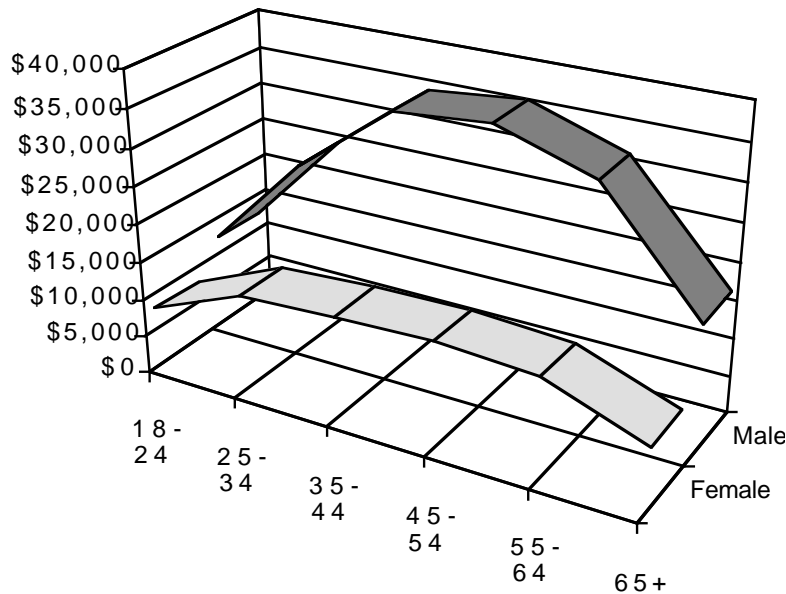
not work in the labor market. The productivity losses due to disorders would be underestimated if the value of household work was not included in personal total income. The estimates of the value of housekeeping services were directly adapted from Rice and associates (1990), who calculated the time spent on housekeeping by men and women and valued the contributions (by specific tasks performed) with the prevailing wage rate for similar tasks in corresponding occupations. To obtain the specific values for Texas, the estimates were first reduced by 1.2 percent (due to the lower level of average earnings in Texas than in the United States), and then updated to 1989 by 10.9 percent (i.e., the wage increases per

employment in non-agricultural industries).

Impairment Factors

The estimated impairment rates are 11.42 percent, 8.84 percent, and 14.35 percent for alcohol, drug, and combined alcohol and drug problem users, respectively (Table C.1, Appendix C). These impairment factors are computed by regressing income on various sociodemographic characteristics of individuals and information regarding alcohol and drug problems. The data used in the regression analysis are from the TCADA Adult Survey, which contains information on family income, age, marital status, number of children, race, education

FIGURE 3.2 MEAN ANNUAL EARNED INCOME BY AGE AND SEX
TEXAS, 1989



level, and information regarding alcohol- and drug-related problems.

To estimate the impairment rates, Rice and associates (1990) employed a timing model that measures the lifetime effect of substance abuse on the current income of individuals with substance problems, taking into account the timing and duration of the disorders. Due to the unavailability of the data “time of onset,” “time of last symptom,” and “time of interview” for Texas, the indicator model for the regression analysis was applied in the current study. The indicator model refers to the estimates that are based on dichotomous indicator (dummy variable) measures of individual substance abuse. For example, if the respondent is considered an alcohol abuser (i.e., answered yes to 2 or more problem-drinker questions in the survey), the dichotomous indicator of problem drinking takes on a value of 1 (with the value of 0 assigned to a non-abusing person).

The specification of the regression model and the measurement of control and disorder variables are described in Appendix C. The regression results are also presented in Table C.1 of Appendix C. The WLS (weighted least squares) is used in the regression estimation to correct the imperfect population sampling of individuals by age, race, and regions. The impairment rates, defined as the

percentages of income losses due to alcohol and drug abuse, are adjusted and transformed from the estimated regression coefficients.

Per Capita Income Losses

Multiplying the impairment rates by the per capita total incomes in Table 3.3 yields the estimates of income losses per person with substance-related problems (Table 3.4). Since income levels are higher for males than for females, males have much higher average income losses per individual with substance problems. The average income loss per male with substance problems ranges from \$1,248 to \$5,492; per female, it ranges from \$929 to \$2,940.

3.3 TOTAL ALCOHOL AND DRUG ABUSE MORBIDITY LOSSES

The total morbidity losses shown in Table 3.5 are estimated by multiplying the number of alcohol and drug problem users in Table 3.2 by the average income loss per person with substance problems in Table 3.4. Total morbidity costs due to alcohol and drug abuse amounted to \$5,632 million for Texas in 1989. Alcohol abuse accounts for \$4,272 million, drug abuse accounts for \$373 million, and combined alcohol and drug abuse accounts for \$987 million. About \$4,626 million of the loss is attributed to males, and \$1,006 million to

Table 3.4
 Per Capita Income Losses by Age, Sex, and Disorder
 Texas, 1989

	Average Income Loss per Alcohol/Drug Abuser	
	Male	Female
Alcohol Abuse		
18-24	\$1,611	\$1,414
25-34	\$3,216	\$2,256
35-54	\$4,369	\$2,339
55-64	\$3,903	\$1,948
65+	\$2,119	\$1,200
Drug Abuse		
18-24	\$1,248	\$1,095
25-34	\$2,491	\$1,747
35-54	\$3,384	\$1,812
55-64	\$3,023	\$1,509
65+	\$1,641	\$929
Combined Alcohol and Drug Abuse		
18-24	\$2,026	\$1,777
25-34	\$4,043	\$2,836
35-54	\$5,492	\$2,940
55-64	\$4,906	\$2,449
65+	\$2,663	\$1,508

Source: Product of Table 3.3 and the impairment rates. The impairment rates are from Table C.1 in Appendix C: 11.42% for alcohol abuse, 8.84% for drug abuse, and 14.35% for combined alcohol and drug abuse.

Table 3.5
 Alcohol and Drug Abuse Morbidity Losses:
 Noninstitutionalized Population, by Age, Sex and Disorder
 Texas, 1989 (\$ in millions)

	TOTAL	Male	Female
TOTAL	\$5,632	\$4,626	\$1,006
18-24	\$1,013	\$704	\$309
25-34	\$1,936	\$1,574	\$362
35-54	\$2,217	\$1,927	\$290
55-64	\$363	\$331	\$32
65+	\$104	\$90	\$14
Alcohol Abuse	\$4,272	\$3,581	\$692
18-24	\$664	\$463	\$201
25-34	\$1,363	\$1,103	\$261
35-54	\$1,874	\$1,664	\$210
55-64	\$287	\$273	\$14
65+	\$84	\$78	\$6 *
Drug Abuse	\$373	\$241	\$132
18-24	\$87	\$35	\$52
25-34	\$125	\$77	\$49
35-54	\$126	\$101	\$24
55-64	\$28	\$23	\$5
65+	\$7	\$5	\$2
Combined Alcohol and Drug Abuse	\$987	\$805	\$182
18-24	\$262	\$206	\$56
25-34	\$447	\$394	\$53
35-54	\$217	\$161	\$56
55-64	\$48	\$36 **	\$13 **
65+	\$13	\$8 **	\$5 **

Notes: * The imputation was made by multiplying the ratio of the 65+ to the 55-64 age group drug abuse morbidity loss by the 55-64 age group alcohol abuse morbidity loss.

** The imputation was made by multiplying the ratio of the 55-64 (or 65+) to the 35-54 age group drug abuse morbidity loss by the 35-54 age group combined alcohol and drug abuse morbidity loss.

Source: Product of Table 3.2 and Table 3.4.

females. The largest productivity losses (\$2,217 million) occur in the 35-54 age group.

The TCADA Adult Survey indicated no prevalence of combined alcohol and drug abuse for those 55 and over, and no prevalence of alcohol abuse for females aged 65 and over. Therefore, the numbers of abusers for these groups are not available in Table 3.2. A gender-specific imputed loss was based on the ratio of morbidity loss due to drug abuse for the 55-64 (or 65+) age group divided by that for the 35-54 age group. Multiplying the ratio by the morbidity loss due to combined alcohol and drug abuse for the 35-54 age group results in the imputed loss due to combined alcohol and drug abuse for the 55-64 (or 65+) age group. The morbidity loss due to alcohol abuse for females aged 65 and over was then imputed by using the same methodology. The additional imputed losses for males are about \$44 million and for females \$24 million (represented by asterisks in Table 3.5).

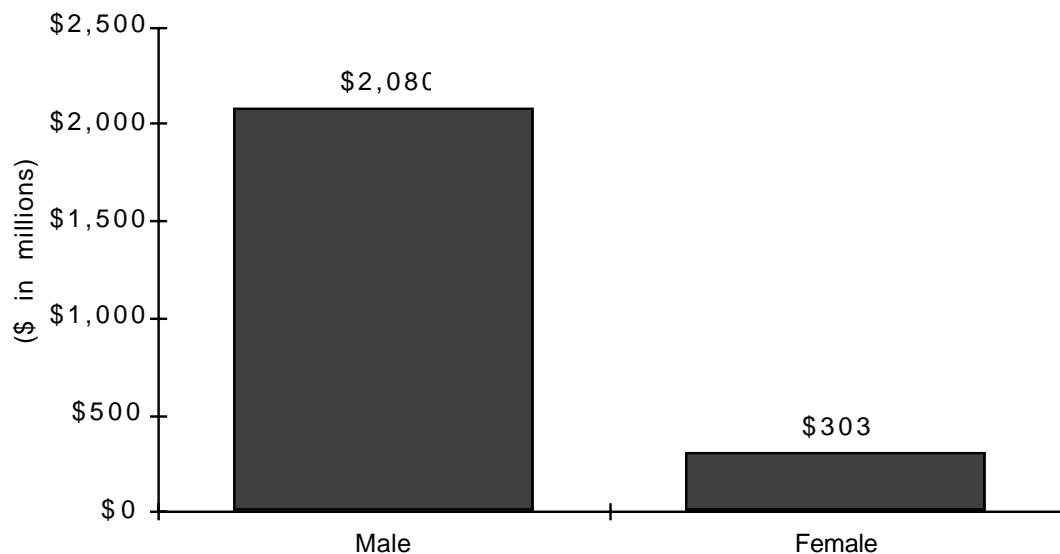
CHAPTER IV - MORTALITY COSTS: PREMATURE DEATH

Mortality costs represent the discounted present value of future lifetime earnings that are lost because people die prematurely from substance abuse. In other words, this cost category is based on the premise that if individuals had not died prematurely, they would have continued production for a number of years. The productivity losses due to premature deaths account for a substantial percentage of total costs. The estimated cost was derived by multiplying the number of substance-related deaths by the present value of an

individual's lifetime earnings. Of the total \$2,383 million for mortality costs in Texas in 1989, \$2,046 million (85.9 percent) are ascribable to alcohol abuse mortality and \$337 million (14.1 percent) to drug abuse mortality. Male deaths represent a loss of \$2,080 million (87.3 percent) and female deaths account for \$303 million (12.7 percent) (Figure 4.1).

The methodology for estimating the number of deaths associated with alcohol and drug abuse, and the approach and economic assumptions in calculating the

FIGURE 4.1 TOTAL SUBSTANCE-RELATED MORTALITY COSTS BY SEX
TEXAS, 1989 (\$ IN MILLIONS)



present value of lifetime earnings, are described below. The formula for computing the individual's lifetime earnings is presented in Appendix D.

4.1 ALCOHOL AND DRUG ABUSE DEATHS

In 1989, 7,922 Texans died from alcohol and drug disorders (7,210 alcohol abuse deaths and 712 drug abuse deaths; Table 4.1 and Table 4.2). Included are all deaths for which the underlying cause is coded as alcohol/drug abuse or alcohol/drug-related. The system of International Classification of Diseases (ICD) was used to categorize and code the information on causes of death that are shown on death certificates. The ICD provides a system by which descriptions of diseases and causes of death on death certificates are transformed to numerical code for general statistical use. The number of deaths according to appropriate ICD codes are multiplied by the proportion of the deaths in that code which is caused by alcohol or drug abuse. In this study, ICD code designations and the alcohol-attributable fractions (AAF) for the estimation of mortality costs were based on previous national studies (CDC 1990c; Rice et al. 1990). The total number of deaths by ICD code were derived from the 1989 Texas Department of Health statistical death tape.

In Table 4.1, the alcohol-attributable fractions (AAF) are estimates of the

proportion of deaths from a specific disease or injury that are causally linked to alcohol abuse. For direct causes, the AAF is always set to unity (1.00); that is, 100 percent of deaths in these categories are attributed to alcohol abuse. For indirect causes, the AAFs show a wide range. For example, about 75 percent of the deaths from cancer of the esophagus, 42 percent of motor vehicle traffic accidents, and 5 percent of diabetes mellitus deaths are estimated to involve alcohol. AAFs for chronic diseases were based on clinical case series studies and analytical epidemiologic studies, and the AAFs for injuries were based on injury surveillance studies that reported alcohol involvement (CDC 1990c).

To determine the alcohol-related mortality (ARM) total, the number of deaths in each category was multiplied by the disease-specific AAF. The deaths occurring before the age indicated (the second column of Table 4.1) were not included in the calculations (CDC 1990c). The total number of alcohol-related deaths in Texas in 1989 was estimated at 7,210, which accounts for 5.8 percent of deaths from all causes. About 892 of those deaths were directly related to the use of alcohol, and about 6,318 more deaths were indirectly related. Deaths among males totalled 4,976 (69.0 percent) and among females totalled 2,234 (31.0 percent).

Alcoholic cirrhosis of the liver, a direct result of long-term alcohol consumption, is

Table 4.1
 Alcohol-Attributable Fractions (AAF) and Estimated Alcohol-Related
 Mortality (ARM) by Sex and Diagnosis, Texas, 1989

Diagnosis (ICD-9-CM)	AAF	Age (yrs) *	Total ARM	Male		Female	
				Number of Deaths	ARM	Number of Deaths	ARM
Total			7,210		4,976		2,234
Direct Cause			892		723		169
Alcoholic psychoses (291)	1.00	>=15	19	18	18	1	1
Alcohol dependence syndrome (303)	1.00	>=15	180	154	154	26	26
Alcohol abuse (305.0)	1.00	>=15	25	20	20	5	5
Alcoholic polyneuropathy (357.5)	1.00	>=15	1	1	1	0	0
Alcoholic cardiomyopathy (425.5)	1.00	>=15	37	31	31	6	6
Alcoholic gastritis (535.3)	1.00	>=15	2	1	1	1	1
Alcoholic fatty liver (571.0)	1.00	>=15	12	10	10	2	2
Acute alcoholic hepatitis (571.1)	1.00	>=15	44	32	32	12	12
Alcoholic cirrhosis of the liver (571.2)	1.00	>=15	403	323	323	80	80
Alcoholic liver damage, unspecified (571.3)	1.00	>=15	157	123	123	34	34
Excessive blood level of alcohol (790.3)	1.00	>=15	0	0	0	0	0
Alcohol poisonings (E860.0-860.1)	1.00	>=15	12	10	10	2	2
Indirect Cause			6,318		4,253		2,065
Malignant Neoplasms			906		653		253
Cancer of the lip, tongue, oral cavity, pharynx (140-149)	0.50 * *	>=35	187	258	129	144	58
Cancer of the esophagus (150)	0.75	>=35	366	383	287	105	79
Cancer of the stomach (151)	0.20	>=35	156	481	96	301	60
Cancer of the liver and intrahepatic bile ducts (155)	0.15	>=35	91	366	55	239	36
Cancer of the larynx (161)	0.50 * *	>=35	106	171	86	51	20
Cardiovascular Diseases			609		242		367
Essential hypertension (401)	0.08	>=35	19	94	8	141	11
Cerebrovascular disease (430-438)	0.07	>=35	590	3,348	234	5,077	355
Respiratory Diseases			213		104		109
Respiratory tuberculosis (011-012)	0.25	>=35	24	73	18	24	6
Pneumonia and influenza (480-487)	0.05	>=35	189	1,717	86	2,054	103

Table 4.1 (cont'd)

Diagnosis (ICD-9-CM)	AAF	Age (yrs) *	Total ARM	Male		Female	
				Number of Deaths	ARM	Number of Deaths	ARM
Digestive Diseases			553		322		231
Diseases of esophagus, stomach and duodenum (530-537) ***	0.10	>=35	48	246	25	231	23
Other cirrhosis of liver (571.5-571.6)	0.50	>=35	442	528	264	355	178
Acute pancreatitis (577.0)	0.42	>=35	59	72	30	68	29
Chronic pancreatitis (577.1)	0.60	>=35	5	6	4	3	2
Unintentional Injuries			2,369		1,656		713
Motor vehicle accidents (E810-825)	0.42	>=0	1,548	2,580	1,084	1,106	465
Other road vehicle accidents (E826-829)	0.20	>=0	2	10	2	0	0
Water transport accidents (E830-838)	0.20	>=0	15	71	14	5	1
Air and space transport accidents (E840-845)	0.16	>=0	15	83	13	11	2
Accidental falls (E880-888)	0.35	>=15	236	357	125	316	111
Accidents caused by fires (E890-899)	0.45	>=0	142	206	93	109	49
Accidental drownings (E910)	0.38	>=0	158	347	132	70	27
All other accidents (E867-869, E900-909, E911-929)	0.25	>=15	253	774	194	238	60
Intentional Injuries			1,525		1,216		308
Suicide (E950-959)	0.28	>=15	579	1,647	461	422	118
Homicide (E960-969)	0.46	>=15	945	1,642	755	413	190
Metabolic Disorders			144		59		84
Diabetes mellitus (250)	0.05	>=35	144	1,185	59	1,689	84

Notes: * Deaths occurring before this age are not included in the calculations.

** The AAF for females is 0.40.

*** This diagnosis excludes 2 deaths due to alcoholic gastritis (535.3) stated as direct cause. Numbers may not add to totals due to rounding.

Sources: 1. Texas Department of Health statistical death tape, 1989.

2. 'Alcohol-Related Mortality and Years of Potential Life Lost --- United States, 1987' (Centers for Disease Control, MMWR, 11:39).

3. International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM), 3rd edition (Practice Management Information Corporation).

the leading alcohol-related fatal disease (403 deaths). Alcohol dependence syndrome and alcoholic liver damage are the second (180 deaths) and third (157 deaths) leading causes of direct alcohol deaths. When indirect effects of alcohol abuse are counted, alcoholism becomes an even more significant mortality factor. Alcoholics have significantly higher accident, homicide, and suicide rates than do non-alcoholics. Estimates indicate that alcohol abuse is implicated in 46 percent of homicides, 45 percent of fires, 42 percent of all motor vehicle accidents, 38 percent of all drownings, and 28 percent of suicides. Motor vehicle accidents and homicides are the top two indirect categories of alcohol-related deaths, and were responsible for 1,548 and 945 deaths, respectively, in Texas in 1989.

Table 4.2 presents the drug-attributable fractions and estimated deaths of drug abuse. For indirect causes, about 13 percent of homicides are estimated to involve drugs. The estimate of 13 percent is based on the drug-related causal factors of the criminal justice system discussed in Chapter V. Recent literature indicates that future studies will show an even higher percentage of cocaine-related violence (cf. Hanzlick & Gowitt 1991). The total number of deaths caused by drug abuse was about 712 (537 males and 175 females) in Texas in 1989. The leading

cause of death was accidental poisoning by drugs, medicaments and biologicals (313 deaths).

4.2 PRESENT VALUE OF LIFETIME EARNINGS

To obtain the mortality costs of alcohol and drug abuse, the present value of all future earnings was measured for individuals who died because of alcohol and drug abuse. The present value calculation rests on the notion that income which will be earned in the future has to be discounted back to the present by using a discount rate. The methodological problems, economic variables, and assumptions in estimating the costs of premature death are summarized below.

4.2.1 METHODOLOGY

In this study, the human capital (HC) approach was used to evaluate the costs of premature death and to calculate the present value of future earnings and household services. The HC method measures the value of the individual's life in terms of the forgone earnings or labor contribution to the economy over his remaining lifetime. The HC approach assumes that the value of life to society is estimated by future production potential, or calculated as the discounted present value of expected labor earnings (Landefeld and Seskin 1982). Labor earnings are counted before taxes and non-labor income

Table 4.2
Drug-Attributable Fractions (DAF) and Estimated Drug Abuse Mortality (DAM)
by Sex and Diagnosis, Texas, 1989

Diagnosis (ICD-9-CM)	DAF	Age (yrs)	Total *DAM	Male		Female	
				Number of Deaths	DAM	Number of Deaths	DAM
Total			712		537		175
Drug psychoses (292)	1.00	>=0	1	1	1	0	0
Drug dependence (304)	1.00	>=0	18	14	14	4	4
Nondependent abuse of drugs (305.1-305.9)	1.00	>=0	59	39	39	20	20
Drug withdrawal syndrome in newborn (779.5)	1.00	>=0	0	0	0	0	0
Accidental poisoning by drugs, medicaments and biologicals (E850-859)	1.00	>=0	313	238	238	75	75
Heroin, methadone, other opiates and related narcotics causing adverse effects in therapeutic use (E935.0-935.2, E937-940)	1.00	>=0	0	0	0	0	0
Injury undetermined whether accidentally or purposely inflicted from poisoning by drugs, medicaments and other (E980)	1.00	>=0	54	32	32	22	22
Homicide (E960-969)	0.13**	>=15	267	1,642	213	413	54

Notes: * Deaths occurring before this age are not included in the calculations.

** Based on Chapter V of the current study.

Sources: 1. Texas Department of Health statistical death tape, 1989.

2. The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

3. International Classification of Diseases, 9th revision, Clinical Modification (ICD-9-CM), 3rd (Practice Management Information Corporation).

is not included (because personal capital holdings are not affected by an individual's continued existence). The HC method ignores non-market activities such as pain and suffering, loss of leisure, and aversion to risk that may be more important to an individual than economic loss. Nevertheless, the imputation of the value for housekeeping activities is the only adjustment for non-market activities in HC estimates. The discount rate used to calculate the present value of future earnings represents the opportunity cost of society investing in life-saving programs. One difficulty in choosing the discount rate is that the tax effects and risk aversion factors may cause the rates of return of society's investments to differ from the rates of return of private investments. Choice of a discount rate would affect the relative valuations of human life.

The mathematical expression to characterize the human capital method is shown in Appendix D. The proper economic variables used in the formula are described below and presented in Table 4.3.

4.2.2 ECONOMIC VARIABLES AND ASSUMPTIONS

Earnings

The mean annual earnings for year-round, full-time (35 or more hours per week) workers, including salary income and net income from farm and nonfarm self-employment, were used to estimate the

discounted lifetime earnings. The age- and gender-specific data on earnings from the *Texas 1980 Census of Population* (U.S. Department of Commerce 1983) were updated to 1989 by the inflation rate of Texas manufacturing average earnings (61.3 percent). Two assumptions were made: that the annual growth rate of productivity throughout an individual's working span would be 1 percent, and that the individual's future pattern of earnings within an age and sex group would follow the pattern reported by the Census during the base year.

Table 4.3 shows that Texas male earnings are almost twice that of female earnings for each age group. The maximum point of earned income for both sexes is in the age group 45-54 (\$36,446 for males and \$15,946 for females). The higher earnings for men create a significant gender difference in the present value of future lifetime benefits.

Labor Force Participation Rate

Labor force participants are those individuals aged 16 and over who perform some market work in the economy (or who are actively seeking work). The labor force participation rate is defined as the proportion of labor force participants in the total population. The percent of population with earnings cited in the Census was used as the labor force participation rate for calculating the

Table 4.3
Economic Variables for Estimating Present Value of Lifetime Earnings, Texas, 1989

Earned Income and Imputed Value of Housekeeping						
Age	Mean Annual Earnings [1]		Mean Annual Value of Housekeeping Services [2]			
	Male	Female	In Labor Force		Not in Labor Force	
			Male	Female	Male	Female
15-24	\$13,827	\$9,422	\$2,222	\$6,447	\$4,557	\$11,531
25-34	\$25,908	\$14,446	\$3,000	\$8,960	\$5,708	\$13,986
35-44	\$35,199	\$15,519	\$3,260	\$9,420	\$5,984	\$14,503
45-54	\$36,446	\$15,946	\$3,275	\$8,185	\$6,000	\$13,269
55-64	\$33,318	\$15,644	\$3,502	\$8,041	\$6,227	\$13,182
65+	\$23,747	\$12,677	\$1,847	\$4,135	\$3,301	\$6,815

Labor Force and Housekeeping Participation Rates

Age	Percent of Population With Earnings		Housekeeping Participation Rates			
	Male	Female	In Labor Force [3]		Not in Labor Force [4]	
			Male	Female	Male	Female
15-24	71.32%	60.84%	1.14%	9.72%	2.27%	19.44%
25-34	94.69%	71.81%	0.78%	11.61%	1.55%	23.22%
35-44	95.10%	67.89%	0.23%	8.99%	0.46%	17.98%
45-54	91.41%	59.66%	0.30%	11.75%	0.60%	23.49%
55-64	78.80%	45.39%	0.89%	13.14%	1.77%	26.27%
65+	34.55%	15.23%	1.48%	16.56%	2.96%	33.11%

- Notes: [1] Mean Annual Earnings are for year-round full-time workers, including salary income and net income from farm and nonfarm self-employment.
 [2] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.) estimates and adjusted by the changes of Texas wages and salaries per non-agriculture employment.
 [3] The figures are 50% of those not in labor force.
 [4] Based on TCADA Adult Survey (Texas Commission on Alcohol and Drug Abuse).

- Sources: 1. Detailed Population Characteristics, Texas 1980 Census of Population (U.S. Department of Commerce, Bureau of the Census).
 2. Texas Economic Indicators (Bureau of Business Research, U. T. Austin), various issues.
 3. Texas Labor Market Review (Texas Employment Commission), various issues.

present value of lifetime earnings. Participation rates for both part-time and full-time workers were estimated.

For each age group, a much higher proportion of men than of women were employed in Texas in 1989 (the largest difference is 31.8 percent for ages 45-54, and the smallest difference is 10.5 percent for ages 15-24). The highest labor participation rate is 95.1 percent for men in the 35-44 age group, and the highest for women is 71.8 percent in the 25-34 age group.

Value and Participation Rate of Housekeeping Services

The value of household work was added to labor force earnings by using an age- and gender-specific imputed value of housekeeping services for those in the labor force and those not in the labor force (Rice et al. 1990). The values in the present study were adjusted by 10.6 percent (the inflation rate for Texas wages per non-agriculture employment) and by 1.2 percent (to account for the lower wage level of Texas versus the United States). The estimated values of housekeeping services by sex and age category for Texas, 1989, are presented in Table 4.3. The values of housekeeping services are higher for those not in the labor force since this population would likely spend more non-working time on household work than would those in the labor force. The

imputed values of household work for females outside the labor force were almost the same as the earned incomes for employed females, except for ages 65 and over. The highest value for female household services is \$14,503 for the 35-44 age group.

The housekeeping participation rates were derived from the TCADA Adult Survey (TCADA 1988a). Respondents were asked, "Last week were you working full-time, part-time, going to school, keeping house, or what?" About 13.3 percent of total respondents answered "keeping house," and this population represented the housekeeping participation rate of those not in the labor force. As shown in Table 4.3, the rates for women are significantly higher than those for men, partly because more men are employed in the labor market. The highest housekeeping participation rate of those outside the labor force is 33.1 percent for women aged 65 and over. In calculating the housekeeping participation rates of those in the labor force, it was assumed that their housekeeping participation rates are 50 percent of those not in the labor force.

Discount Rates

The present value calculations are quite sensitive to the discount rate used in human capital estimates: the higher the

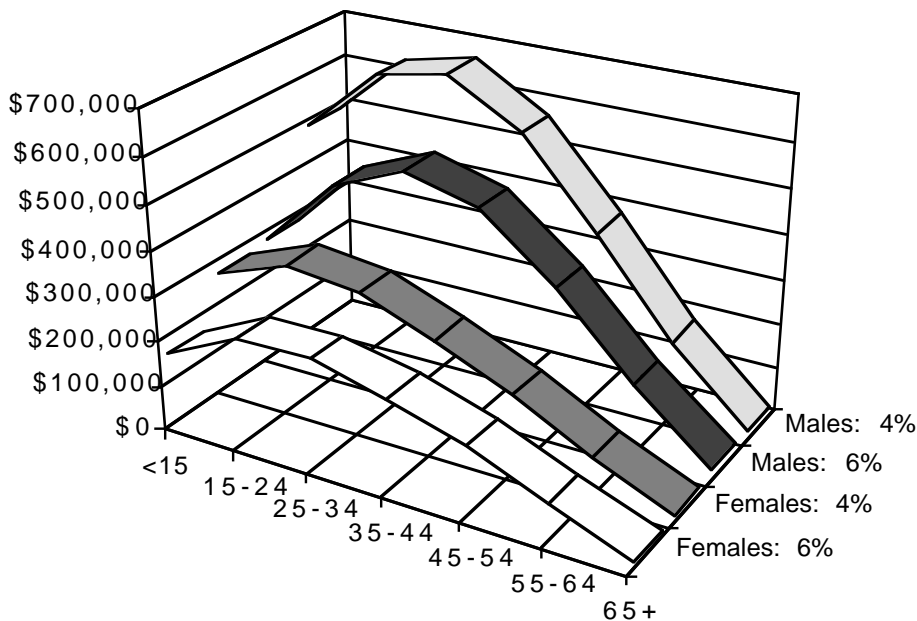
discount rate, the lower the present value of future earnings. Because estimates of future lifetime earnings are usually made in constant (or base-year) dollars, the chosen nominal discount rate has to be converted to a real rate by an adjustment for inflation. A 4 percent discount rate was used for the Texas mortality cost estimation to convert expected future earnings into 1989 dollars. In 1989, the nominal long-term rate of government bond yield was 8.5 percent and the inflation rate for consumer prices was 4.8 percent, which resulted in a real rate of 3.7 percent (or approximately 4 percent). For

comparison, Figure 4.2 and Table 4.4 show a 6 percent discount rate for estimates of the present value of lifetime earnings.

4.2.3 ESTIMATED RESULTS

Appendix D shows the formula for calculating the discounted present value of lifetime earnings. Two assumptions were made in these estimates: that individuals retire at age 75 (i.e., the working span is from age 16 to age 75), and that the maximum life span for individuals is 85 years.

FIGURE 4.2 PRESENT VALUE OF EXPECTED FUTURE LIFETIME EARNINGS BY AGE, SEX, AND DISCOUNT RATE, TEXAS, 1989*



*All economic estimates in text and tables use a 4% discount rate; the 6% rate shown here is only for comparison.

Table 4.4
Present Value of Expected Future Lifetime Earnings by
Age, Sex and Discount Rate, Texas, 1989

Age	Male		Female	
	4 percent	6 percent	4 percent	6 percent
< 15	\$483,770	\$280,608	\$266,951	\$162,706
15 - 24	\$627,873	\$439,563	\$329,129	\$238,148
25 - 34	\$660,709	\$509,802	\$310,146	\$240,494
35 - 44	\$564,901	\$466,471	\$248,704	\$202,667
45 - 54	\$381,112	\$332,931	\$174,282	\$150,090
55 - 64	\$177,643	\$163,070	\$89,904	\$81,531
65+	\$23,097	\$21,816	\$13,506	\$12,757

Note: See Appendix D for the formula for calculating the present value of lifetime earnings.

For a male under age 15, the 4 percent discounted present value of future lifetime earnings is \$483,770. The male present-value amount reaches a peak of \$660,709 for the 25-34 age group, and declines to \$23,097 for ages 65 and over. The “hump-shaped” pattern is similar for females. However, the present values of lifetime earnings for females are much lower than those for males, and the peak point is in the 15-24 age group at \$329,129 (or about 50 percent of the peak male value).

4.3 YEARS OF POTENTIAL LIFE LOST

Age- and gender-specific life expectancy data were used to estimate the number of years of potential life lost due to premature deaths (Texas Department of Health 1989). Life expectancy is the

average number of years that a person can expect to live after a given age. The number of years of potential life lost was measured by multiplying the number of deaths by the life expectancy in years per age and sex category. Table 4.5 presents life expectancy in years by sex and five-year age group for Texans in 1989. Females have a higher life expectancy than males for each age group.

Table 4.6 and Table 4.7 show that a total of 261,791 years of potential life were lost due to alcohol- and drug-related deaths in Texas in 1989. More than 35 percent of the Texans who died from alcohol-related causes were 65 and over (Figure 4.3), with the greatest number of deaths occurring in people aged 75 and over (1,497 deaths). Overall, there were an estimated 231,279 years of potential life lost from alcohol

abuse deaths in Texas in 1989 (165,846 for males and 65,432 for females). Though females have a longer life expectancy than males, fewer females died from alcohol-related causes, resulting in a smaller proportion of alcohol-related years of potential life lost for females. The age groups with the largest number of alcohol-related person years lost are 20-24 for men (22,125 person-years) and 75 and over for women (9,883 person-years).

The estimated 712 drug-related deaths in Texas in 1989 represent the equivalent of 30,512 years of potential life lost. Figure 4.4 shows the age distribution of drug abuse deaths. Most people who died

from drug abuse were quite young; the 25-44 age group accounted for about 449 deaths (63.0 percent). About 22,973 (75.3 percent) of the drug-related person years lost are attributable to males and 7,539 (24.7 percent) to females. The age groups with the largest number of person years lost for drug abuse mortality during 1989 are 30-34 (21.4 percent), 25-29 (20.2 percent), and 35-39 (16.5 percent).

4.4 MORTALITY COSTS OF ALCOHOL AND DRUG ABUSE

Productivity losses due to premature death are estimated by multiplying the number of deaths by the discounted

Table 4.5
Life Expectancy in Years by Age and Sex, Texas, 1989

Age	Total	Male	Female
<1	76.16 *	73.19 *	79.16 *
1 -- 4	75.93	73.01	78.87
5 -- 9	72.08	69.16	75.01
10 -- 14	67.16	64.25	70.08
15 -- 19	62.25	59.36	65.15
20 -- 24	57.53	54.74	60.31
25 -- 29	52.85	50.21	55.47
30 -- 34	48.20	45.71	50.64
35 -- 39	43.55	41.18	45.83
40 -- 44	38.92	36.69	41.04
45 -- 49	34.35	32.23	36.34
50 -- 54	29.93	27.95	31.76
55 -- 59	25.75	23.93	27.38
60 -- 64	21.85	20.27	23.22
65 -- 69	18.34	17.11	19.35
70 -- 74	15.19	14.43	15.77
75 +	12.50	12.50	12.50

* Life expectancy at birth.

Source: Texas Vital Statistics 1989 (Texas Department of Health).

Table 4.6
 Alcohol Abuse Mortality: Number of Deaths and Years of Potential Life Lost
 by Age and Sex, Texas, 1989

Age	Number of Alcohol Abuse Deaths			Years of Potential Life Lost [1]		
	Total	Male	Female	Total	Male	Female
<1	6	6	0	436	405	30
1--4	90	52	38	6,757	3,776	2,980
5--9	61	37	24	4,371	2,542	1,829
10--14	58	40	18	3,808	2,553	1,255
15--19	397	295	102	24,156	17,525	6,631
20--24	496	404	92	27,653	22,125	5,529
25--29	525	423	103	26,911	21,220	5,691
30--34	467	378	88	21,761	17,294	4,467
35--39	443	349	94	18,678	14,357	4,322
40--44	421	321	101	15,898	11,764	4,134
45--49	379	291	88	12,579	9,382	3,198
50--54	375	279	96	10,862	7,803	3,058
55--59	416	307	108	10,323	7,355	2,968
60--64	526	378	148	11,101	7,662	3,438
65--69	544	372	172	9,686	6,361	3,325
70--74	510	339	171	7,585	4,890	2,695
75+	1,497	707	791	18,714	8,832	9,883
TOTAL	7,210	4,976	2,234	231,279	165,846	65,432

Notes: [1] Product of Table 4.5 and the number of alcohol abuse deaths.
 Numbers may not add to totals due to rounding.

Table 4.7
 Drug Abuse Mortality: Number of Deaths and Years of Potential Life Lost
 by Age and Sex, Texas, 1989

Age	Number of Drug Abuse Deaths			Years of Potential Life Lost [1]		
	Total	Male	Female	Total	Male	Female
<1	0	0	0	0	0	0
1--4	2	0	2	158	0	158
5--9	0	0	0	0	0	0
10--14	2	0	2	140	0	140
15--19	37	29	8	2,241	1,741	500
20--24	78	61	17	4,379	3,365	1,013
25--29	120	92	28	6,167	4,625	1,542
30--34	140	111	29	6,518	5,072	1,445
35--39	120	101	19	5,026	4,154	872
40--44	69	55	15	2,600	2,003	597
45--49	30	22	7	985	714	271
50--54	22	13	9	663	370	293
55--59	17	12	5	425	276	149
60--64	17	11	6	361	232	129
65--69	16	9	8	299	146	154
70--74	10	5	5	153	71	82
75+	32	16	16	397	203	194
TOTAL	712	537	175	30,512	22,973	7,539

Notes: [1] Product of Table 4.5 and the number of drug abuse deaths.
 Numbers may not add to totals due to rounding.

FIGURE 4.3 ALCOHOL AND ALCOHOL-RELATED DEATHS BY AGE
TEXAS, 1989 (7,210 DEATHS)

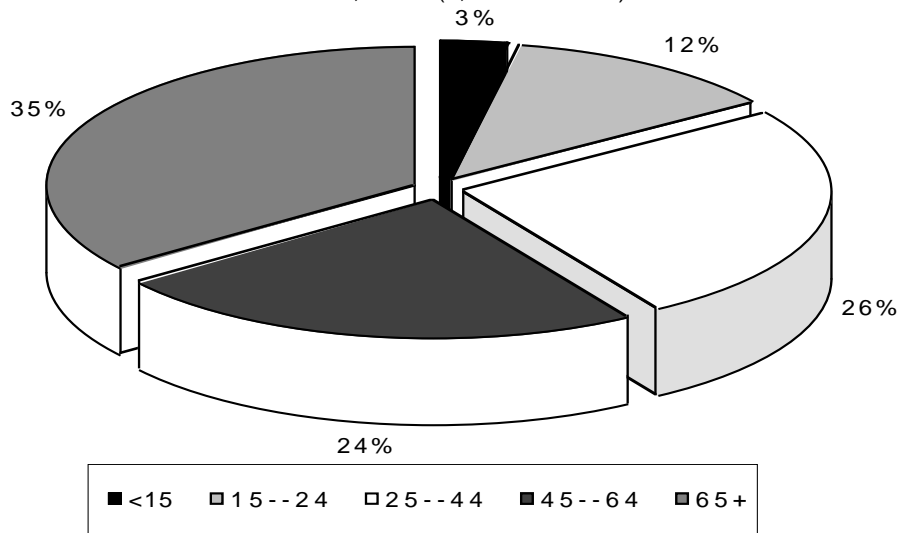
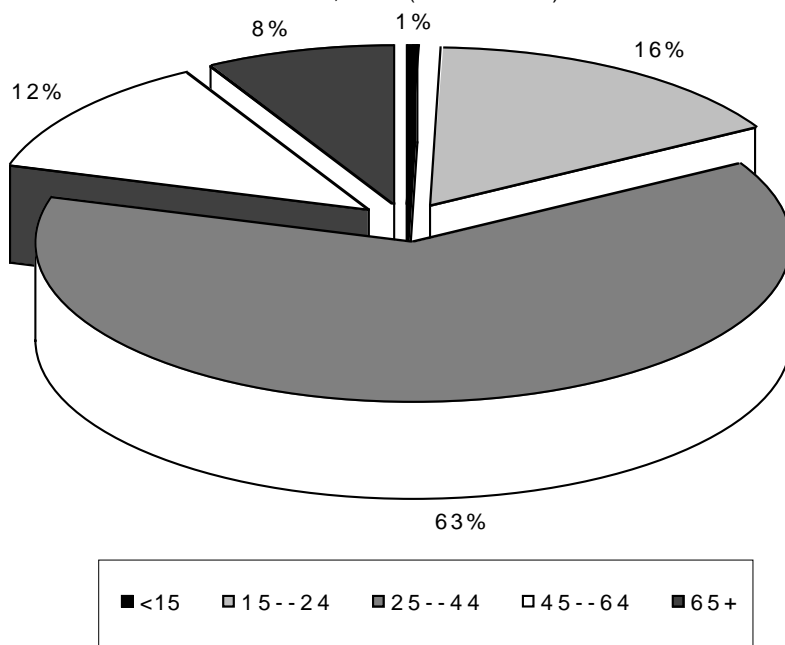


FIGURE 4.4 DRUG AND DRUG-RELATED DEATHS BY AGE
TEXAS, 1989 (712 DEATHS)



present value of an individual's future earnings. The number of deaths related to alcohol and drug abuse, years of potential life lost, and discounted productivity losses by age and sex for Texas in 1989 are presented in Table 4.8 and Table 4.9. In those tables the data from Table 4.6 and 4.7 (regarding the number of deaths and person years lost) are aggregated into 10-year age groups. The mortality productivity losses were estimated at a 4 percent discount rate.

As indicated in Table 4.8, a total of 7,210 alcohol abuse deaths resulted in 231,279 years of potential life lost (32.08 years per death), which translates to the equivalent of a loss of \$2,046 million in future earnings in 1989 dollars (\$283,805 per death). For 4,976 male Texans who died from alcohol abuse causes, there were 165,846 person years (33.33 years per death) and \$1,783 million (\$358,297 per death) lost. Female alcohol-related deaths amounted to 65,432 person years (29.29 years per death) and \$263 million (\$117,873 per death) lost. This large difference between male and female losses is due to fewer deaths and lower earnings for females. The age group with the most alcohol-related productivity losses is 25-34, representing \$588 million (28.8 percent) of the total. The age group among men with the largest dollar loss is 25-34 (\$529 million), and among women is 15-24 (\$64 million).

A total of 712 Texans who died from drug-related causes in 1989 represented 30,512 years of potential life lost (42.84 years per death) and \$336.5 million productivity losses (\$472,522 per death). The 537 male drug-related deaths accounted for 75.3 percent (22,973 person-years) of the years of potential life lost and 88.3 percent (\$297.3 million) of the dollar losses. Although the number of person years lost per death is slightly higher for females than for males (43.15 years vs. 42.74 years), the average dollar losses per death are much higher for males (\$553,116 for males and \$224,565 for females). All figures vary by age.

The total losses of alcohol and drug abuse mortality from Table 4.8 and Table 4.9 are combined and summarized in Table 4.10. In Texas in 1989, the 7,922 deaths due to alcohol and drug abuse resulted in 261,791 person years lost and a loss of \$2.38 billion to the economy (at a 4 percent discount rate). Alcohol abuse deaths accounted for 91.0 percent of total alcohol and drug abuse deaths, 88.3 percent of the total person years lost, and 85.9 percent of the total productivity dollar losses. However, per-death losses for both person-years and productivity are higher for drug-related deaths than for alcohol-related deaths (42.84 years vs. 32.08 years and \$472,522 vs. \$283,805), because on average the drug-related

Table 4.8
 Alcohol Abuse Mortality: Number of Deaths, Years of Potential Life Lost, and
 Productivity Losses by Age and Sex, Texas, 1989

	Number of Deaths	Years of Potential Life Lost		Productivity Losses [1]	
		Total Person Years Lost	Years Per Death	Amount (thousands)	Amount Per Death
Total	7,210	231,279	32.08	\$2,046,267	\$283,805
<15	214	15,371	71.73	\$86,183	\$402,180
15-24	893	51,810	58.03	\$502,817	\$563,147
25-34	992	48,673	49.08	\$588,394	\$593,264
35-44	864	34,576	40.01	\$426,574	\$493,554
45-54	755	23,441	31.07	\$249,453	\$330,599
55-64	942	21,423	22.75	\$144,807	\$153,751
65+	2,551	35,985	14.11	\$48,039	\$18,835
Male	4,976	165,846	33.33	\$1,782,955	\$358,297
<15	134	9,277	69.36	\$64,704	\$483,770
15-24	699	39,650	56.69	\$439,147	\$627,873
25-34	801	38,515	48.08	\$529,215	\$660,709
35-44	669	26,121	39.03	\$378,071	\$564,901
45-54	570	17,185	30.13	\$217,337	\$381,112
55-64	685	15,017	21.91	\$121,749	\$177,643
65+	1,417	20,082	14.17	\$32,732	\$23,097
Female	2,234	65,432	29.29	\$263,312	\$117,873
<15	80	6,094	75.75	\$21,479	\$266,951
15-24	193	12,160	62.86	\$63,670	\$329,129
25-34	191	10,158	53.24	\$59,179	\$310,146
35-44	195	8,455	43.36	\$48,502	\$248,704
45-54	184	6,256	33.95	\$32,117	\$174,282
55-64	256	6,406	24.98	\$23,058	\$89,904
65+	1,133	15,903	14.03	\$15,307	\$13,506

Notes: [1] Based on a 4 percent discount rate.
 Numbers may not add to totals due to rounding.

Table 4.9
Drug Abuse Mortality: Number of Deaths, Years of Potential Life Lost, and
Productivity Losses by Age and Sex, Texas, 1989

	Number of Deaths	Years of Potential Life Lost		Productivity Losses [1]	
		Total Person Years Lost	Years Per Death	Amount (thousands)	Amount Per Death
Total	712	30,512	42.84	\$336,507	\$472,522
<15	4	298	74.48	\$1,068	\$266,951
15-24	115	6,620	57.42	\$65,074	\$564,439
25-34	259	12,685	48.90	\$151,657	\$584,578
35-44	189	7,626	40.34	\$96,169	\$508,747
45-54	52	1,648	31.65	\$16,391	\$314,844
55-64	34	786	23.13	\$5,076	\$149,283
65+	58	849	14.56	\$1,073	\$18,390
Male	537	22,973	42.74	\$297,278	\$553,116
<15	0	0	--	\$0	--
15-24	91	5,106	56.23	\$57,017	\$627,873
25-34	203	9,698	47.75	\$134,183	\$660,709
35-44	155	6,157	39.60	\$87,820	\$564,901
45-54	35	1,084	30.63	\$13,484	\$381,112
55-64	23	509	22.11	\$4,088	\$177,643
65+	30	420	14.14	\$686	\$23,097
Female	175	7,539	43.15	\$39,229	\$224,565
<15	4	298	74.48	\$1,068	\$266,951
15-24	24	1,514	61.83	\$8,057	\$329,129
25-34	56	2,987	53.02	\$17,474	\$310,146
35-44	34	1,469	43.75	\$8,349	\$248,704
45-54	17	564	33.81	\$2,907	\$174,282
55-64	11	278	25.28	\$988	\$89,904
65+	29	429	14.99	\$387	\$13,506

Notes: [1] Based on a 4 percent discount rate.
Numbers may not add to totals due to rounding.

Table 4.10
Alcohol and Drug Abuse Mortality: Number of Deaths, Years of Potential Life Lost, and
Productivity Losses by Disorder and Sex, Texas, 1989

	Number of Deaths	Years of Potential Life Lost		Productivity Losses [1]	
		Total Person Years Lost	Years Per Death	Amount (thousands)	Amount Per Death
Total	7,922	261,791	33.05	\$2,382,774	\$300,779
Alcohol Abuse	7,210	231,279	32.08	\$2,046,267	\$283,809
Drug Abuse	712	30,512	42.84	\$336,507	\$472,522
Male	5,513	188,819	34.25	\$2,080,233	\$377,332
Alcohol Abuse	4,976	165,846	33.33	\$1,782,955	\$358,297
Drug Abuse	537	22,973	42.74	\$297,278	\$553,116
Female	2,409	72,971	30.29	\$302,541	\$125,588
Alcohol Abuse	2,234	65,432	29.29	\$263,312	\$117,873
Drug Abuse	175	7,539	43.15	\$39,229	\$224,565

Notes: [1] Based on a 4 percent discount rate.
Numbers may not add to totals due to rounding.

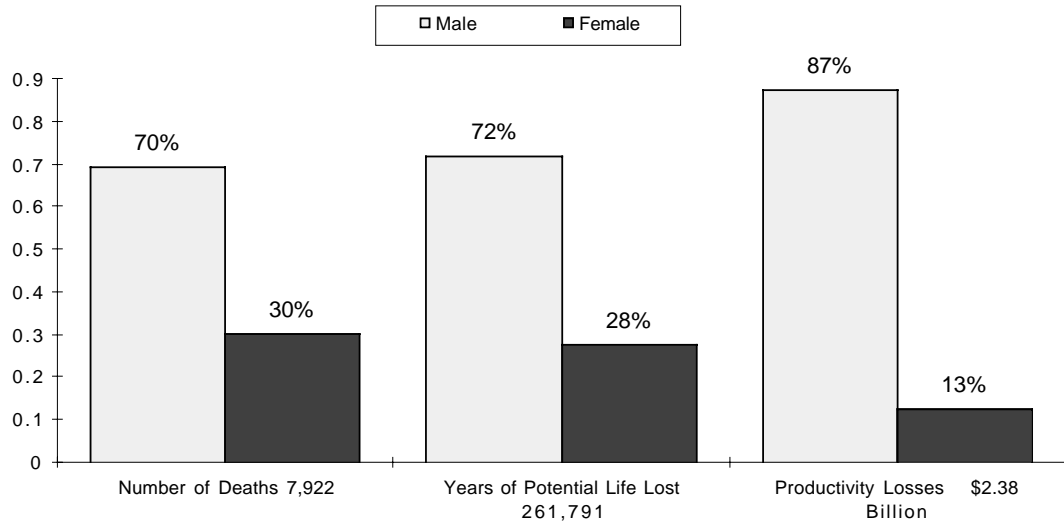
decedents are younger than the alcohol-related decedents.

Males account for 69.6 percent of total alcohol and drug abuse deaths, 72.1 percent of the total years of potential life lost, and 87.3 percent of the total productivity losses (Figure 4.5). The person years lost per death are 34.25 years for men compared to 30.29 years for women; mortality costs are \$377,332 per

male death compared to \$125,588 per female death.

Many persons who died from alcohol and drug abuse in 1989 were young. About 41.8 percent of the total 7,922 deaths were in the 15-44 age group, and this age group accounted for 61.9 percent of the total person years lost to alcohol and drug disorders and 76.8 percent of the total dollar losses.

FIGURE 4.5 ALCOHOL AND DRUG ABUSE MORTALITY LOSSES BY SEX
TEXAS, 1989



4.5 TOTAL DEATHS VS. ALCOHOL AND DRUG ABUSE DEATHS

Total 1989 deaths and substance-related deaths are presented in Table 4.11. The data are based on Texas Department of Health statistics. In 1989, a total of 124,563 Texans died (66,449 males and 58,114 females). The age category for 65 years and over had the most deaths (84,282), accounting for 67.7 percent of the total. Overall, there were an estimated 2,670,249 years of potential life and \$14.5 billion in productivity lost from all Texas deaths in 1989.

In Texas in 1989, deaths related to substance abuse comprised 6.4 percent of total deaths, 9.8 percent of the total person years lost, and 16.4 percent of the total productivity dollar losses (Figure 4.6). The age distribution of substance-related deaths is quite different from that of total deaths. Many people who died of substance-related disorders were relatively young: 41.8 percent of the total 7,922 decedents were aged 15-44 (12.7 percent were 15-24 years old, 15.8 percent were 25-34 years old, and 13.3 percent were 35-44 years old). On the contrary, only 10.3 percent of deaths from

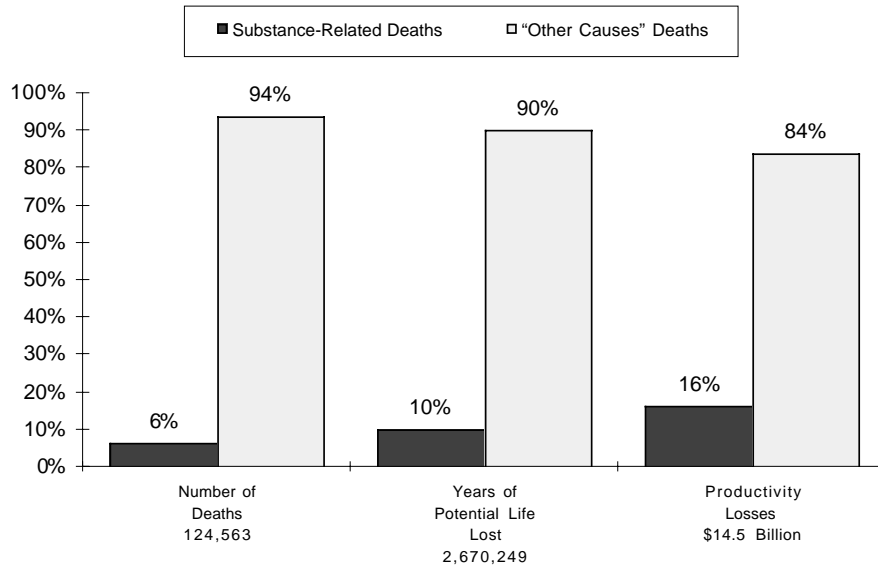
Table 4.11
 Total and Substance-Related Mortality: Number of Deaths, Years of Potential Life Lost, and Productivity Losses by Age and Sex, Texas, 1989

	All Causes Deaths			Alcohol and Drug Abuse Deaths		
	Number of Deaths	Years of Potential Life Lost	Productivity Losses [1] (millions)	Number of Deaths	Years of Potential Life Lost	Productivity Losses [1] (millions)
Total	124,563 [2]	2,670,249	\$14,499	7,922	261,791	\$2,383
<15	4,133	308,075	\$1,619	218	15,669	\$87
15-24	2,853	165,858	\$1,582	1,008	58,430	\$568
25-34	4,573	224,182	\$2,636	1,251	61,358	\$740
35-44	5,387	216,449	\$2,537	1,053	42,202	\$523
45-54	7,607	237,549	\$2,338	807	25,088	\$266
55-64	15,686	359,754	\$2,266	976	22,210	\$150
65+	84,282	1,158,382	\$1,522	2,609	36,834	\$49
Male	66,449 [2]	1,514,758	\$11,456	5,514	188,820	\$2,080
<15	2,380	171,133	\$1,151	134	9,277	\$65
15-24	2,151	121,904	\$1,351	790	44,757	\$496
25-34	3,473	166,063	\$2,295	1,004	48,212	\$663
35-44	3,785	147,398	\$2,138	825	32,278	\$466
45-54	4,896	146,204	\$1,866	606	18,268	\$231
55-64	9,750	212,174	\$1,732	708	15,526	\$126
65+	39,986	549,883	\$924	1,447	20,502	\$33
Female	58,114 [2]	1,155,491	\$3,043	2,409	72,971	\$303
<15	1,753	136,942	\$468	84	6,392	\$23
15-24	702	43,954	\$231	218	13,673	\$72
25-34	1,100	58,119	\$341	247	13,146	\$77
35-44	1,602	69,051	\$398	229	9,924	\$57
45-54	2,711	91,345	\$472	201	6,820	\$35
55-64	5,936	147,581	\$534	267	6,684	\$24
65+	44,296	608,499	\$598	1,162	16,332	\$16

Notes: [1] Based on a 4 percent discount rate.
 [2] Includes deaths with age unknown.
 Numbers may not add to totals due to rounding.

Source: Texas Department of Health statistical death tape, 1989 (for the number of deaths).

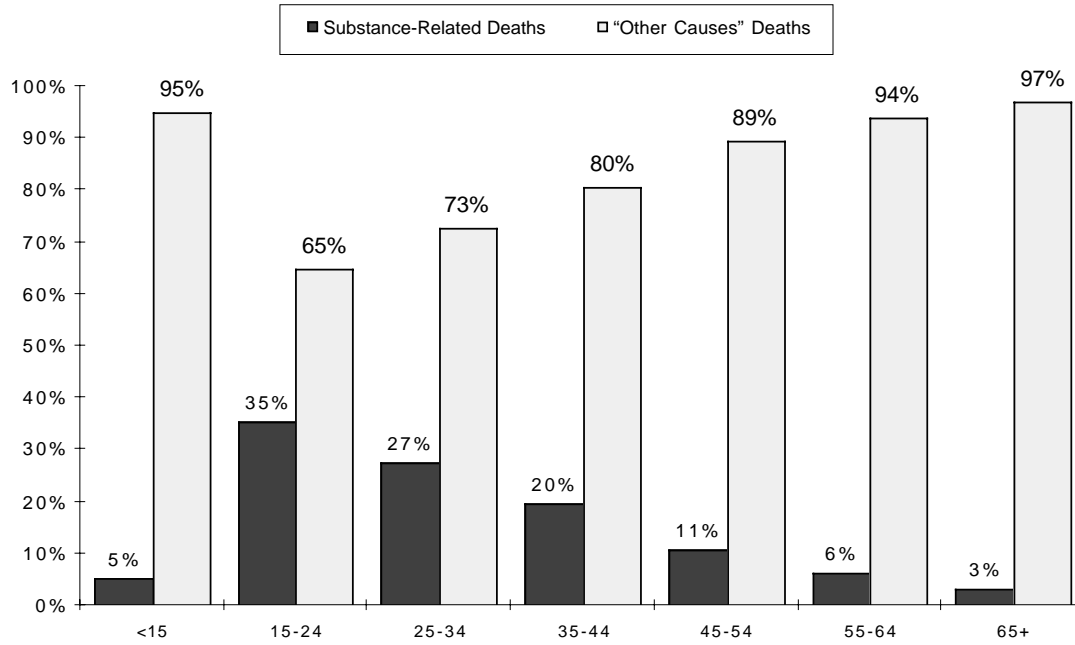
FIGURE 4.6 SUBSTANCE-RELATED AND NON-SUBSTANCE-RELATED LOSSES AS PERCENT OF TOTAL, TEXAS, 1989



all causes were aged 15-44 (2.3 percent were 15-24 years old, 3.7 percent were 25-34 years old, and 4.3 percent were 35-44 years old).

Alcohol and drug abuse take their toll most heavily among young adults: substance-related deaths account for 35.3 percent of all deaths among those aged 15-24, and 27.4 percent of all deaths among those aged 25-34 (Figure 4.7). Substance-related deaths account for 8.3 percent of all male deaths, and 4.1 percent of all female deaths.

FIGURE 4.7 SUBSTANCE-RELATED DEATHS AS PERCENT OF ALL CAUSES OF DEATH BY AGE, TEXAS, 1989



CHAPTER V - OTHER RELATED COSTS

“Other related costs” include direct costs (public and private expenditures for the prevention and consequences of crime, motor vehicle crash losses, costs of social welfare program administration, and fire losses) and indirect costs (the value of productivity losses of criminal victimization, the value of productivity losses for individuals incarcerated as a result of criminal offense, and the opportunity costs of time for individuals engaged in crime careers rather than legal employment).

Establishing the proportion of crime costs attributed to alcohol and drug abuse is a difficult task. *Substance Use Among Texas Department of Corrections Inmates, 1988* (Fredlund et al. 1990) showed that most Texas inmates have problems with alcohol and illicit drugs, and that inmates heavily involved with the more expensive drugs report more active criminal careers. However, this information does not clarify the role of alcohol and drugs in committing crimes, and does not establish causality. For example, some people who do not use substances are heavily involved in criminal activities, and some people with alcohol and drug problems do not commit any crimes. Therefore, this study can estimate the costs of crime that are

associated with substance use, but not the costs of crime that are caused by substance abuse.

The estimates of direct and indirect costs related to substance use for Texas, 1989, are summarized in Table 5.1. These “other related costs” of alcohol and drug abuse amount to \$3,372 million (\$949 million for alcohol abuse, \$2,422 million for drug abuse, and \$0.4 million for combined alcohol and drug abuse). The direct costs (expenditures for crime, crash losses, costs of welfare, and fire losses) total \$1,705 million; of this amount, expenditures related to crime account for 77.6 percent (\$1,323 million). The indirect costs (productivity losses and opportunity costs) are estimated at \$1,667 million; of this amount, crime careers account for 64.5 percent (\$1,075 million).

5.1 DIRECT COSTS

The majority of “other related” direct costs are associated with the prevention and consequences of crime (public criminal justice system and drug traffic control expenditures, private legal defense costs, and crime-related property losses). In addition to the criminal expenses, costs for motor vehicle crashes, social welfare program administration and fire

Table 5.1
Other Related Direct and Indirect Costs by Type of Cost and Disorder, Texas, 1989

Type of Cost	Amount (\$ in millions)			
	TOTAL	Alcohol Abuse	Drug Abuse	Combined Alc&Drug Abuse
Total	\$3,372	\$949	\$2,422	\$0.40
<u>Direct Costs</u>	<u>\$1,705</u>	<u>\$737</u>	<u>\$967</u>	<u>\$0.40</u>
Crime	\$1,323	\$369	\$954	--
Public Expenditures	\$1,115	\$331	\$784	--
Criminal Justice System	\$1,081	\$331	\$750	--
Police Protection	\$532	\$84	\$448	--
Legal and Adjudication	\$97	\$19	\$77	--
State Correction	\$254	\$84	\$170	--
Local Correction	\$199	\$143	\$56	--
Drug Traffic Control	\$34	--	\$34	--
Drug Law Enforcement Prevention	\$7	--	\$7	--
Prevention	\$27	--	\$27	--
Private Legal Defense	\$120	\$24	\$96	--
Property Destruction	\$88	\$13	\$74	--
Motor Vehicle Crashes	\$338	\$325	\$12	\$0.40
Social Welfare Administration	\$11	\$10	\$1	--
Fire Destruction	\$33	\$33	--	--
<u>Indirect Costs</u>	<u>\$1,667</u>	<u>\$212</u>	<u>\$1,455</u>	<u>--</u>
Victims of Crime	\$176	\$48	\$128	--
Incarceration	\$416	\$164	\$252	--
Crime Careers	\$1,075	--	\$1,075	--

destruction associated with alcohol and drug abuse are included in the category “other related” direct costs.

5.1.1 CRIMINAL JUSTICE SYSTEM

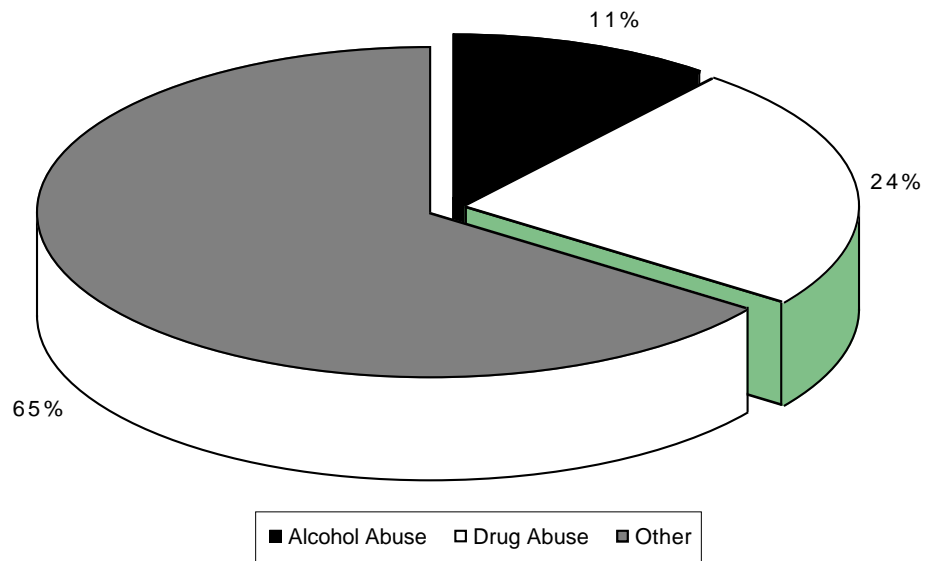
Costs

The total expenditures for the criminal justice system in Texas were estimated at \$3,080 million in 1989 (U.S. Department of Justice 1990d). There are four major components included in the public criminal justice system: police protection, legal and adjudication costs, state corrections, and local corrections. Data for institutions with authority to hold prisoners beyond arraignment (usually 48

hours or more) are included in the category of “corrections.” Data for lock-ups or “tanks” holding prisoners less than 48 hours are included in the category “police protection.”

About 35 percent (\$1,081 million) of the total expenditures of the criminal justice system is associated with alcohol and drug abuse (Figure 5.1): \$532 million (49.2 percent) for police protection, \$254 million (23.5 percent) for state corrections, \$199 million (18.4 percent) for local corrections, and \$97 million (9.0 percent) for legal and judicial services. Tables 5.2 through 5.5 present a more detailed itemization of these costs by type of offense.

FIG 5.1 PERCENT DISTRIBUTION OF TOTAL CRIMINAL JUSTICE SYSTEM EXPENDITURES, TEXAS, 1989 (TOTAL: \$3.1 BILLION)



Methodology

The two main crime classes, Part I offenses and Part II offenses, refer to the categorization used in the Uniform Crime Reporting System of the Texas Department of Public Safety. Part I offenses include homicide, felonious assault (forcible rape and aggravated assault), robbery, burglary, larceny theft, and motor vehicle theft. Part II offenses include driving under the influence, liquor law violations, public drunkenness, stolen property, prostitution, drug law violations, and other offenses. Data for Part I offenses are based on the number of "actual known offenses," whereas the data for Part II offenses are based on arrest information only.

To estimate the offense-specific criminal justice costs associated with alcohol and drug abuse, the "causal factors" for all offenses shown in columns <3> and <4> of Tables 5.2 through 5.5 are determined. The causal factors represent the percentages of known offenses or arrests that are attributable to alcohol and drug abuse. The drug-related causal factors for Part I offenses and stolen property are derived from the TCADA Prison Survey (TCADA 1988b), which was conducted in the fall of 1988 by Texas A&M's Public Policy Resources Laboratory. Texas inmates were asked, "Were drugs in any way involved in the offense for which you are now in prison? [and, if so], How were

drugs involved?" About 42 percent of the inmates who admitted committing the crime for which they were incarcerated said that drugs were a factor in that offense. About 13.2 percent of the violent offenders and 25.4 percent of the property offenders said they took drugs to commit the crime, needed money to buy drugs, or took drugs to remove anxieties about the crime.

The estimates of 13.2 percent and 25.4 percent were used as the drug-related causal factors for violent crime (homicide, felonious assault and robbery) and property crime (burglary, larceny theft, motor vehicle theft and stolen property), respectively. It should be noted that future studies will most likely show an increase in cocaine-related crime. The drug-related causal factor for prostitution could not be estimated from the TCADA Prison Survey. The alcohol-related causal factors for Part I offenses and the drug-related causal factors for prostitution were directly adapted from the national study of Rice and associates (1990).

Police Protection Costs

The police protection costs (PPC) associated with alcohol and drug abuse by type of offense are represented in Table 5.2. The PPC associated with substance abuse are \$531.8 million (\$84.3 million for alcohol abuse and \$447.6 million for drug abuse). The PPC are based on the

Table 5.2
Publicly-Financed Criminal Justice System, Police Protection Costs by Type of Offense in Texas, 1989
(\$ in thousands)

Offense	Known Offenses [1]		Causal Factors (%)		Police Protection Costs (PPC) [2]		
	Number <1>	Percent of Total <2>	Alcohol Abuse <3>	Drug Abuse <4>	Total (<6>+<7>) <5>	Alcohol (<2>x<3>x total PPC) <6>	Drug (<2>x<4>x total PPC) <7>
Homicide	2,029	0.2	46.0	13.2 [7]	\$1,228	\$954	\$274
Felonious Assault	71,931	5.3	26.9 [6]	13.2 [7]	\$29,483	\$19,778	\$9,705
Robbery	37,910	2.8	3.9 [6]	13.2 [7]	\$6,626	\$1,511	\$5,115
Burglary	342,360	25.4	4.7 [6]	25.4 [7]	\$105,331	\$16,447	\$88,884
Larceny Theft	741,642	55.1	3.8 [6]	25.4 [7]	\$221,353	\$28,806	\$192,547
Motor Vehicle Theft	150,974	11.2	4.6 [6]	25.4 [7]	\$46,295	\$7,099	\$39,196
Driving Under Influence	103,008 [3]	--	100.0	--	\$3,413 [8]	\$3,413 [8]	--
Liquor Laws Violations	23,518 [3]	--	100.0	--	\$779 [8]	\$779 [8]	--
Public Drunkenness	165,495 [3]	--	100.0	--	\$5,483 [8]	\$5,483 [8]	--
Stolen Property	2,372 [3]	0.3 [4]	--	25.4 [7]	\$995	--	\$995
Prostitution	7,751 [3]	0.9 [4]	--	12.8 [6]	\$1,639	--	\$1,639
Drug Laws Violations	71,800 [3]	7.9 [5]	--	100.0	\$109,200	--	\$109,200
Other Offenses	336,672 [3]	37.2 [5]	--	--	--	--	--
Total					\$531,825	\$84,269	\$447,555

Notes: [1] Total reported known offenses is 1,346,846.

[2] Total PPC is \$ 1,376,659,000.

[3] Total number of arrests for every offense.

[4] Based on percent of the total number of arrests for non-drug offenses: 833,366.

[5] Based on percent of total arrests: 905,166.

[6] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

[7] Analyzed from TCADA Prison Survey (Texas Commission on Alcohol and Drug Abuse).

[8] The cost of alcohol offense is estimated at \$33.13 times the number of arrests in column <1>.

Sources: 1. Crime in Texas: Calendar Year 1989 (Texas Department of Public Safety, Uniform Crime Reporting).
2. Sourcebook of Criminal Justice Statistics 1989 (U.S. Department of Justice, Bureau of Justice Statistics).

numbers of known offenses for Part I offenses and the numbers of known arrests for Part II offenses. The offense-specific PPC attributed to alcohol and drug abuse were computed by multiplying the percentage of known offenses/arrests in each category (column <2>) by the corresponding causal factor (column <3> or <4>) and by the total Texas public expenditures of police protection of \$1,376.7 million (U. S. Department of Justice 1990d).

The PPC for the alcohol-related offenses (driving under the influence, liquor law violations, and public drunkenness) were estimated on a per-offense basis. Police protection costs and court costs each equalled an estimated \$28.76 in 1985 for every alcohol-defined offense (Rice et al. 1990). The present study adjusted this figure for inflation, making the PPC and court costs each equal \$33.13 for every alcohol-defined offense in 1989. The PPC for these alcohol-defined offenses were measured by multiplying the numbers of known arrests in column <1> by the figure of \$33.13. The PPC for driving under influence are \$3.4 million, liquor law violations \$0.8 million, and public drunkenness \$5.5 million.

Legal and Adjudication Costs

The legal and adjudication costs (LAC) related to alcohol and drug abuse for each offense category are shown in

Table 5.3. The estimated LAC associated with substance abuse are \$96.7 million (\$77.4 million for drug abuse and \$19.3 million for alcohol abuse). The LAC are based on numbers of offenses “cleared by arrest” for Part I offenses and the numbers of known arrests for Part II offenses. The numbers of offenses “cleared by arrest” are computed by multiplying the numbers of known offenses by the clearance rates of offenses shown in the Uniform Crime Reports. Law enforcement agencies in Texas in 1989 reported clearances of 73 percent of murders, 60 percent of forcible rapes, 58 percent of aggravated assaults, 32 percent of robberies, 15 percent of burglaries, 19 percent of larceny thefts, and 16 percent of motor vehicle thefts.

Using the same methodology described above for PPC, the alcohol/drug-related LAC were estimated by multiplying the percentage of offenses cleared by arrest or known arrests in each category (column <2>), by the corresponding causal factor (column <3> or <4>), and by the aggregate public expenses of legal and adjudication services in Texas of \$607.4 million (U. S. Department of Justice 1990d). The LAC for alcohol-defined offenses (driving under the influence, liquor laws violations, and public drunkenness) were determined by multiplying the number of arrests per offense (column <1>) by \$33.13 per arrest.

Table 5.3
Publicly-Financed Criminal Justice System, Legal and Adjudication Costs by Type of Offense in Texas, 1989
(\$ in thousands)

Offense	Known Offenses [1]		Causal Factors (%)		Legal and Adjudication Costs (LAC) [2]		
	No. Cleared by Arrest <1>	Percent of Total <2>	Alcohol Abuse <3>	Drug Abuse <4>	Total (<6>+<7>) <5>	Alcohol (<2>x<3>x total LAC) <6>	Drug (<2>x<4>x total LAC) <7>
Homicide	1,481	0.1	46.0	13.2 [7]	\$395	\$307	\$88
Felonious Assault	41,879	3.1	26.9 [6]	13.2 [7]	\$7,574	\$5,081	\$2,493
Robbery	12,131	0.9	3.9 [6]	13.2 [7]	\$936	\$213	\$722
Burglary	51,354	3.8	4.7 [6]	25.4 [7]	\$6,971	\$1,089	\$5,883
Larceny Theft	140,912	10.5	3.8 [6]	25.4 [7]	\$18,557	\$2,415	\$16,142
Motor Vehicle Theft	24,156	1.8	4.6 [6]	25.4 [7]	\$3,268	\$501	\$2,767
Driving Under Influence	103,008 [3]	--	100.0	--	\$3,413	\$3,413 [8]	--
Liquor Laws Violations	23,518 [3]	--	100.0	--	\$779	\$779 [8]	--
Public Drunkenness	165,495 [3]	--	100.0	--	\$5,483	\$5,483 [8]	--
Stolen Property	2,372 [3]	0.3 [4]	--	25.4 [7]	\$439	--	\$439
Prostitution	7,751 [3]	0.9 [4]	--	12.8 [6]	\$723	--	\$723
Drug Laws Violations	71,800 [3]	7.9 [5]	--	100.0	\$48,183	--	\$48,183
Other Offenses	336,672 [3]	37.2 [5]	--	--	--	--	--
Total					\$96,721	\$19,281	\$77,440

Notes: [1] Total reported known offenses is 1,346,846.

[2] Total LAC is \$ 607,427,000.

[3] Total number of arrests for every offense.

[4] Based on percent of the total number of arrests for non-drug offenses: 833,366.

[5] Based on percent of total arrests: 905,166.

[6] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

[7] Analyzed from TCADA Prison Survey (Texas Commission on Alcohol and Drug Abuse).

[8] The cost of alcohol offense is estimated at \$33.13 times the number of arrests in column <1>.

Sources: 1. Crime in Texas: Calendar Year 1989 (Texas Department of Public Safety, Uniform Crime Reporting).
2. Sourcebook of Criminal Justice Statistics 1989 (U.S. Department of Justice, Bureau of Justice Statistics).

State Correction Costs

The state correction costs (SCC) by type of offense are presented in Table 5.4. The SCC associated with alcohol and drug abuse are estimated at \$253.8 million (\$84.2 million for alcohol and \$169.5 million for drugs). The numbers of state prisoners from *Inmates On-Hand 1989* (Texas Department of Corrections 1989) were used to estimate the SCC. In 1989, there were 41,626 Texas state prisoners (39,911 males and 1,715 females). Column <1> shows the number of state prisoners for each offense category. The offense-specific SCC were computed by multiplying the percentage of state inmates per category (column <2>) by the corresponding causal factor (column <3> or <4>) and by the total expenditures for state corrections of \$621.4 million (U.S. Department of Justice 1990d).

Local Correction Costs

Table 5.5 presents the estimated local corrections costs (LCC) associated with alcohol and drug abuse for each offense. One reason to separate LCC from SCC in the study is that local correctional institutions usually deal with less serious criminal offenders and shorter-period incarcerations than do state institutions (Cruze et al. 1981). The LCC associated with alcohol and drug abuse are \$199.0 million (\$143.1 million for alcohol abuse and \$55.9 million for drug abuse). The

LCC were based on the numbers of known arrests for all offenses. To measure the costs, the percentage of the persons arrested per offense category (column <2>) was multiplied by the appropriate causal factor (column <3> or <4>), and by the total Texas expenses of local corrections of \$424.4 million (U.S. Department of Justice 1990d).

5.1.2 DRUG TRAFFIC CONTROL

A small portion (3.0 percent) of the public expenditures for crime in Texas is attributable to drug traffic control. Two important activities were included: drug law enforcement to reduce the supply of drugs and prevention programs to decrease the demand for drugs. In 1989, drug law enforcement cost \$6.7 million and prevention cost \$27.0 million. The costs of drug law enforcement by state are reported in the *Sourcebook of Criminal Justice Statistics 1989* (U.S. Department of Justice 1990d). The cost for drug prevention activities in Texas (which includes education programs) was based on funding documents of the Texas Commission on Alcohol and Drug Abuse.

5.1.3 PRIVATE LEGAL DEFENSE

Not only public expenditures but also private legal defense costs are included in the substance-related criminal costs. Since the data for private legal services in Texas were not available, it was assumed that the

Table 5.4
Publicly-Financed Criminal Justice System, State Correction Costs by Type of Offense in Texas, 1989
(\$ in thousands)

Offense	State Prisoners [1]		Causal Factors (%)		State Correction Costs (SCC) [2]		
	Number <1>	Percent of Total <2>	Alcohol Abuse <3>	Drug Abuse <4>	Total (<6>+<7>) <5>	Alcohol (<2>x<3>x total SCC) <6>	Drug (<2>x<4>x total SCC) <7>
Homicide	5,731	13.8	46.0	13.2[5]	\$50,645	\$39,352	\$11,292
Felonious Assault	6,645	16.0	26.9[4]	13.2[5]	\$39,776	\$26,683	\$13,093
Robbery	8,420	20.2	3.9[4]	13.2[5]	\$21,493	\$4,902	\$16,591
Burglary	8,856	21.3	4.7[4]	25.4[5]	\$39,791	\$6,213	\$33,578
Larceny Theft	1,780	4.3	3.8[4]	25.4[5]	\$7,759	\$1,010	\$6,749
Motor Vehicle Theft	1,292	3.1	4.6[4]	25.4[5]	\$5,786	\$887	\$4,899
Driving Under Influence [3]	346	0.8	100.0	--	\$5,165	\$5,165	--
Stolen Property	--	--	--	25.4[5]	--	--	--
Prostitution	12	0.0	--	12.8[4]	\$23	--	\$23
Drug Laws Violations	5,582	13.4	--	100.0	\$83,324	--	\$83,324
Other Offenses	2,962	7.1	--	--	--	--	--
Total					\$253,761	\$84,212	\$169,549

Notes: [1] Total state prisoners is 41,626.

[2] Total SCC is \$ 621,365,000.

[3] Driving under influence is the only alcohol-related offense for state prisoners.

[4] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

[5] Analyzed from TCADA Prison Survey (Texas Commission on Alcohol and Drug Abuse).

Sources: 1. Inmates On-Hand 1989 (Texas Department of Corrections).
2. Sourcebook of Criminal Justice Statistics 1989 (U.S. Department of Justice, Bureau of Justice Statistics).

Table 5.5
Publicly-Financed Criminal Justice System, Local Correction Costs by Type of Offense in Texas, 1989
(\$ in thousands)

Offense	Known Arrests [1]		Causal Factors (%)		Local Correction Costs (LCC) [2]		
	Number <1>	Percent of Total <2>	Alcohol Abuse <3>	Drug Abuse <4>	Total (<6>+<7>) <5>	Alcohol (<2>+<3>+ total LCC) <6>	Drug (<2>+<4>+ total LCC) <7>
Homicide	1,550	0.2	46.0	13.2[4]	\$430	\$334	\$96
Felonious Assault	20,759	2.3	26.9[3]	13.2[4]	\$3,903	\$2,618	\$1,285
Robbery	7,676	0.8	3.9[3]	13.2[4]	\$615	\$140	\$475
Burglary	33,432	3.7	4.7[3]	25.4[4]	\$4,718	\$737	\$3,981
Larceny Theft	115,813	12.8	3.8[3]	25.4[4]	\$15,854	\$2,063	\$13,791
Motor Vehicle Theft	15,320	1.7	4.6[3]	25.4[4]	\$2,155	\$330	\$1,824
Driving Under Influence	103,008	11.4	100.0	--	\$48,292	\$48,292	--
Liquor Laws Violations	23,518	2.6	100.0	--	\$11,026	\$11,026	--
Public Drunkenness	165,495	18.3	100.0	--	\$77,587	\$77,587	--
Stolen Property	2,372	0.3	--	25.4[4]	\$282	--	\$282
Prostitution	7,751	0.9	--	12.8[3]	\$465	--	\$465
Drug Laws Violations	71,800	7.9	--	100.0	\$33,661	--	\$33,661
Other Offenses	336,672	37.2	--	--	--	--	--
Total					\$198,989	\$143,128	\$55,861

Notes: [1] Total known arrests is 905,166.

[2] Total LCC is \$ 424,359,000.

[3] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

[4] Analyzed from TCADA Prison Survey (Texas Commission on Alcohol and Drug A

Sources: 1. Crime in Texas: Calendar Year 1989 (Texas Department of Public Safety, Uniform Crime Reporting).
2. Sourcebook of Criminal Justice Statistics 1989 (U.S. Department of Justice, Bureau of Justice Statistics).

ratio of the total annual payroll for private legal services to the total public legal and adjudication costs was the same in Texas as in the United States. The United States ratio of 1.246 (Rice et al. 1990) and the total public legal and adjudication costs of \$607.4 million in Texas resulted in the total of \$756.9 million expended for private legal services in Texas.

It was assumed that the proportion of the substance-related expenses for private legal services to the total amount of private legal services was the same as the proportion for public legal and judicial services. From the previous estimation of public legal and adjudication costs in Table 5.3, the proportions would be 0.032 for alcohol abuse and 0.127 for drug abuse. Therefore, the cost of private legal defense associated with substance abuse in Texas is \$120.3 million (\$24.2 million for alcohol abuse and \$96.1 million for drug abuse).

5.1.4 PROPERTY DESTRUCTION IN CRIME

The property lost due to criminal activities is also included in "other related direct costs." Table 5.6 shows that the values of property destroyed by crime are \$13.5 million for alcohol-related crime and \$74.1 million for drug-related crime. The offense-specific property damage losses associated with alcohol and drug abuse were estimated by multiplying the total values of property damage per crime

category in the first column by the appropriate casual factor in the second or third column.

Because *Crime in Texas* (Texas Department of Public Safety 1990) only reports the value of property stolen, the ratios of victimizations resulting in damage losses (property damage) and theft losses (property stolen) in the United States were used to calculate the value of property damage in Texas by crime category. These U.S. ratios were derived from *Criminal Victimization in the United States, 1988* (U.S. Department of Justice 1990b). The total values of damaged property due to assault, robbery, burglary, larceny theft and motor vehicle theft are \$294.9 million; about one-third (\$87.6 million) of the total amount is associated with substance abuse (\$13.5 million for alcohol abuse and \$74.1 million for drug abuse).

5.1.5 MOTOR VEHICLE CRASHES

Motor vehicle crashes due to alcohol and drug abuse cost Texas \$337.7 million in 1989 (\$325.4 million for alcohol abuse, \$11.9 million for drug abuse, and \$0.4 million for combined alcohol and drug abuse), which is about 20 percent of total "other related direct costs." Motor vehicle crashes fall into three accident categories: those with fatalities, those with non-fatal injuries, and those with property damage only. For each kind of accident category there are four specific cost elements: legal/

Table 5.6
 Property Destruction in Crime by Type of Crime, Texas, 1989
 (\$ in thousands)

Type of Crime	Value of Total Damages [1]	Causal Factors (%)		Property Damage Associated With:	
		Alcohol Abuse	Drug Abuse	Alcohol Abuse	Drug Abuse
Assault	\$357	26.9	0.0 [2]	\$96	\$0
Robbery	\$5,643	3.9	13.2	\$220	\$745
Burglary	\$176,483	4.7	25.4	\$8,295	\$44,827
Larceny Theft	\$37,562	3.8	25.4	\$1,427	\$9,541
Motor Vehicle Theft	\$74,893	4.6	25.4	\$3,445	\$19,023
Total	\$294,938	--	--	\$13,483	\$74,135

Notes: [1] Derived from the values of property stolen and the ratios of victimizations resulting in damage losses (property damage) and theft losses (property stolen) by type of crime.

[2] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

Sources: 1. Crime in Texas: Calendar Year 1989 (Texas Department of Public Safety, Uniform Crime Reporting).
 2. Criminal Victimization in the United States, 1988 (U.S. Department of Justice).

court costs, insurance administration, accident investigation, and vehicle damage. Table 5.7 presents the motor vehicle crash costs for Texas in 1989 by type of disorder, cost category, and type of accident.

According to *Current Substance Abuse Trends in Texas* (TCADA 1990b), the number of motor vehicle crash fatalities in 1989 due to alcohol abuse, drug abuse and combined alcohol and drug abuse were 1,295, 79 and 10, respectively. The numbers of non-fatal injuries were 31,825, 1,129 and 28, respectively. Of accidents in which there was only property damage, about 3 percent was due to alcohol abuse; there is no evidence of a causal relationship for the other disorders (Cruze et al. 1981). Therefore, of the total 233,967 crashes which incurred only property damage in Texas in 1989, about 7,019 were alcohol-related.

The costs in each of the accident categories for 1989 were derived from a study of societal costs of motor vehicle accidents (Faigin 1976) which reported the average costs per fatality and injury by Abbreviated Injury Scale (AIS) level, and per vehicle for property damage only (PDO) accidents. The AIS, which was set up by the National Highway Traffic Safety Administration for analyzing injury severity data, is applied as follows: AIS-1 for minor, AIS-2 for moderate, AIS-3 for severe (not life threatening), AIS-4 for

severe (life threatening, survival probable), AIS-5 for critical (survival uncertain), and AIS-6 for maximum severity (currently untreatable). The AIS-6 level applies to accidents with fatalities. The overall average of the first five AIS costs (AIS-1 to AIS-5) was used as the average value per non-fatal injury in this present study.

The average costs of each category used in Faigin's study were updated to 1989 using changes in the following price indexes obtained from the *Statistical Abstract of the United States, 1990* (U.S. Bureau of Labor Statistics 1990) and *Monthly Labor Review* (U.S. Bureau of Labor Statistics 1985-1991): (1) legal and court costs: consumer price index - other goods and services, (2) insurance administration: consumer price index - transportation, (3) accident investigation: employment cost index, wages and salaries - state and local government workers, and (4) vehicle damage: consumer price index - auto maintenance and repair.

A summary of the average societal costs *per* accident category in 1989 dollars is presented below:

Cost Category	Fatalities	Non-fatal	
		Injuries	PDO
Legal/Court Costs	\$ 5,989.0	\$ 2,075.7	\$ 19.1
Insurance Administration	671.4	496.2	68.3
Accident Investigation	224.0	145.6	16.8
Vehicle Damage	9,280.7	6,666.3	732.7

Table 5.7
 Motor Vehicle Crash Costs due to Alcohol and Drug Abuse, Texas, 1989
 (\$ in thousands)

Disorder & Cost Category	TOTAL	Fatalities [1]	Non-fatal Injuries [2]	Property Damage Only [3]
TOTAL	\$337,743	\$22,372	\$309,496	\$5,874
Alcohol Abuse	\$325,447	\$20,934	\$298,639	\$5,874
Legal/Court Costs	\$73,949	\$7,756	\$66,059	\$134
Insurance Administration	\$17,140	\$869	\$15,792	\$479
Accident Investigation	\$5,042	\$290	\$4,634	\$118
Vehicle Damage	\$229,316	\$12,019	\$212,155	\$5,143
Drug Abuse	\$11,871	\$1,277	\$10,594	--
Legal/Court Costs	\$2,817	\$473	\$2,343	--
Insurance Administration	\$613	\$53	\$560	--
Accident Investigation	\$182	\$18	\$164	--
Vehicle Damage	\$8,259	\$733	\$7,526	--
Combined Alcohol and Drug Abuse	\$424	\$162	\$263	--
Legal/Court Costs	\$118	\$60	\$58	--
Insurance Administration	\$21	\$7	\$14	--
Accident Investigation	\$6	\$2	\$4	--
Vehicle Damage	\$279	\$93	\$187	--

Notes: [1] The numbers of fatalities due to alcohol, drug and combined alcohol and drug abuse are 1,295, 79, and 10, respectively.
 [2] The numbers of non-fatal injuries due to alcohol, drug and combined alcohol and drug abuse are 31,825, 1,129, and 28, respectively.
 [3] The total accidents for property damage only is 233,967. Based on Economic Costs to Society of Alcohol and Drug Abuse and Mental Illness: 1977 (Cruze et al.), 3 percent (7,019) of the total is due to alcohol at

Sources: 1. Societal Costs of Motor Vehicle Accidents - 1975 (Faigin).
 2. Statistical Abstract of the United States, 1987/1990 (U.S. Department of Commerce).
 3. Current Substance Abuse Trends in Texas (Texas Commission on Alcohol and Drug Abuse).
 4. Data from the Texas Department of Public Safety.
 5. Monthly Labor Review (U. S. Bureau of Labor Statistics), various issues.

The total accident-specific costs for motor vehicle crashes in Table 5.7 were computed by multiplying the total number of fatalities, injuries, or PDO by the corresponding average costs per accident category provided above. The costs of PDO for drug abuse and combined alcohol and drug abuse are not available for estimation. Just over 96 percent of the total substance-related cost of motor vehicle crashes are attributed to alcohol abuse, and over 91 percent of total substance-related costs result from non-fatal injury crashes.

5.1.6 SOCIAL WELFARE ADMINISTRATION

Alcohol and drug addiction can contribute to income loss for the abusers and their families. To compensate for reduced income, cash payments are often made to these individuals through unemployment, welfare, social security, or public assistance programs. Part of the expenses of the state's social welfare system is thus included in the "other related direct costs" of substance abuse.

Social welfare expenditures are referred to by economists as "transfer payments" which only represent a transfer of income loss from one individual to another and do not create additional economic costs. Therefore, only the administrative and managerial costs of social welfare programs were included as economic costs to society.

Table 5.8 presents the social welfare administrative costs due to substance abuse for Texas in 1989, which totalled \$10.6 million (\$9.8 million for alcohol abuse and \$0.8 million for drug abuse).

Methodology

Several social welfare programs administer to large numbers of people with alcohol and drug abuse problems: (1) Old Age, Survivors, and Disability Insurance (OASDI) payments, (2) unemployment insurance, (3) railroad temporary disability insurance, (4) state temporary disability insurance, (5) workers' compensation, (6) public assistance, (7) supplemental security income, (8) food stamps, (9) veterans pensions and rehabilitation, and (10) vocational rehabilitation (Cruze et al. 1981). The Texas-specific expenditures for programs (1), (2), (5), (7), and (8) are directly provided from the *Statistical Abstract of the United States, 1990* (U.S. Bureau of Labor Statistics 1990) and *Social Security Bulletin* (U.S. Department of Health and Human Services 1990). For programs (3), (4), (6), (9) and (10), the percent of United States workers with taxable earnings that were from Texas (6.7 percent) was multiplied by the national dollar amounts to obtain the Texas-specific expenditures. All social welfare expenses were updated to 1989.

Table 5.8
Social Welfare Expenditures Under Public Programs and Administrative Costs due to Alcohol and Drug Abuse, Texas, 1989
(\$ in thousands)

Program	Total Expenditures	Administrative Costs		Causal Factors (%) [4]			Costs for Alcohol and Drug Abuse	
		Percent [4]	Amount <1>	Alcohol Abuse <2>	Drug Abuse <3>	Alcohol Abuse <1>><2>	Drug Abuse <1>><3>	Total
OASDI Payments	\$12,090,000	1.2	\$145,080	2.6	0.3	\$3,772	\$435	\$4,207
Unemployment Insurance	\$1,131,697	12.1	\$136,935	--	--	--	--	--
Railroad Temporary Disability Insurance	\$1,307	11.8	\$154	2.6	0.3	\$4	\$0	\$4
State Temporary Disability Insurance	\$193,362	4.0	\$7,734	2.6	0.3	\$201	\$23	\$224
Workers' Compensation [1]	\$1,441,872	7.4	\$106,699	--	--	--	--	--
Public Assistance [2]	\$1,643,175	11.4	\$187,322	0.5	--	\$937	--	\$937
Supplemental Security Income	\$681,424	8.0	\$54,514	1.9	--	\$1,036	--	\$1,036
Food Stamps	\$1,031,232	7.8	\$80,436	0.5	--	\$402	--	\$402
Veterans Pensions and Rehabilitation	\$1,047,210	3.2	\$33,511	10.2	1.1	\$3,418	\$369	\$3,787
Vocational Rehabilitation [3]	\$99,428	4.7	\$4,673	--	--	--	--	--
Total	\$19,360,707		\$757,058			\$9,770	\$827	\$10,597

Notes:

- [1] Excludes hospital and medical benefits.
- [2] Excludes medical vendor payments and social services.
- [3] Excludes medical services and research.
- [4] Based on The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985 (Rice et al.).

Sources:

- 1. Statistical Abstract of the United States, 1990 (U.S. Department of Commerce).
- 2. Social Security Bulletin: Annual Statistical Supplement, 1990 (U.S. Dept. of Health and Human Services).
- 3. Monthly Labor Review (U.S. Bureau of Labor Statistics), October 1990.

The total Texas-specific social welfare expenditures by program are presented in the first column of Table 5.8. The OASDI program affects a large proportion of the public and accounts for the largest share (62.4 percent) of the total social welfare expenditures. The amount for workers' compensation excludes hospital and medical benefits; the public assistance program amount excludes medical vendor payments (those made directly to suppliers of medical care) and social services; and the vocational rehabilitation program amount excludes the payments of medical services and research.

The percentages of the social welfare expenses devoted to administration and management were adapted from Rice and associates (1990). The administrative costs were computed by multiplying these percentages by the total program expenditures. Column <1> of Table 5.8 shows the social welfare administrative costs by program. Administrative costs account for about 4 percent (\$757.1 million) of the total program expenditures.

To establish the social welfare administrative costs due to alcohol and drug abuse, the causal factors were adapted from Rice and associates (1990) and are shown in columns <2> and <3> of Table 5.8. The costs for alcohol and drug abuse were measured by multiplying the total administrative costs (column <1>) by the proper causal factor per program.

5.1.7 FIRE DESTRUCTION

The National Fire Protection Association estimates that property loss caused by fire cost \$29.34 per capita in 1987 dollars (U.S. Bureau of Labor Statistics 1990). Adjusted for inflation, the amount rises to \$32.03 per capita in 1989 dollars. The estimated percentage of fire destruction that is related to alcohol abuse is 6.1 percent (Cruze et al. 1981). Therefore, of the total \$545 million of property destroyed by fire in Texas in 1989, an estimated \$33.2 million is related to alcohol abuse.

5.2 INDIRECT COSTS

The category "other related indirect costs" consists of productivity losses for victims of crime, for individuals incarcerated as a result of criminal offense, and for individuals with crime careers. The total for this cost category in Texas in 1989 was \$1,667 million (\$212 million for alcohol abuse and \$1,455 million for drug abuse). "Other related indirect costs" are lower (by about 2 percent) than "other related direct costs."

5.2.1 VICTIMS OF CRIME

Productivity losses for victims of crime are shown in Table 5.9. The total amount for substance-related productivity losses is \$176.2 million (\$47.8 million for alcohol abuse and \$128.5 million for drug abuse). The following data were used to estimate

Table 5.9
Productivity Losses for Victims of Crime by Type of Crime, Texas, 1989
(\$ in thousands)

Type of Crime	Number [1]	Average Work Days Lost [2]	Causal Factors (%)		Productivity Losses [3]		
			Alcohol Abuse	Drug Abuse	Alcohol Abuse	Drug Abuse	Total
Rape	11,373	6.2	26.9	13.2	\$1,625	\$798	\$2,423
Assault	311,573	3.8	26.9	13.2	\$27,291	\$13,392	\$40,683
Robbery	71,650	4.5	3.9	13.2	\$1,078	\$3,647	\$4,724
Burglary	578,588	2.1	4.7	25.4	\$4,893	\$26,446	\$31,339
Larceny Theft	2,143,345	1.6	3.8	25.4	\$11,167	\$74,641	\$85,807
Motor Vehicle Theft	175,130	2.5	4.6	25.4	\$1,726	\$9,529	\$11,255
Total	3,291,659	--	--	--	\$47,780	\$128,452	\$176,232

Notes: [1] Derived from the number of known offenses and the ratio of victimizations to offenses by type of crime.
 [2] Based on the percent distribution of victimizations resulting in loss of time from work.
 [3] Based on Texas manufacturing average earnings of \$85.69 per day.

Sources: 1. Crime in Texas: Calendar Year 1989 (Texas Department of Public Safety, Uniform Crime Reporting).
 2. Crime in the United States, 1989 (U.S. Department of Justice).
 3. Criminal Victimization 1989 (U.S. Department of Justice).
 4. Criminal Victimization in the United States, 1988 (U.S. Department of Justice).

the costs: (1) the number of victims by type of crime, (2) the average number of work days lost by victims, and (3) the causal factors of alcohol-related crime and drug-related crime by offense category.

The total number of victims of crime in Texas was about 3,291,659 in 1989. The number of victims per criminal offense in Texas was based on the United States ratios of the victimizations to the known offenses, which were estimated from *Criminal Victimization 1989* (U.S. Department of Justice 1990a) and *Crime in the United States, 1989* (U.S. Department of Justice 1990c). Those ratios are 1.43 for forcible rape, 1.89 for robbery, 4.87 for aggravated assault, 1.69 for burglary, 2.89 for larceny theft, and 1.16 for motor vehicle theft. The number of victims shown in the first column of Table 5.9 was derived by multiplying the ratios by the number of known offenses in Texas.

The average number of work days lost for victims of crime was derived from *Criminal Victimization in the United States, 1988* (U.S. Department of Justice 1990b), and based on the percent distribution of victimizations resulting in loss of time from work and the number of days lost by type of crime. Victims of crime on average lose the following number of work days: 6.2 for rape, 3.8 for assault, 4.5 for robbery, 2.1 for burglary, 1.6 for larceny theft, and 2.5 for motor vehicle theft. Total productivity losses per victim of

crime were estimated by multiplying the average work days lost by the Texas manufacturing average earnings of \$85.69 per day (for both men and women) in 1989 dollars.

The causal factors for alcohol- and drug-related crime listed in the third and fourth columns of Table 5.9 are the same as those used in the estimation of public expenditures on the criminal justice system. Productivity losses attributed to alcohol and drug abuse were computed by multiplying the total number of victims by the value of lost productivity per victim (i.e., average work days lost multiplied by \$85.69) and by the specific causal factor per crime category. Productivity losses due to alcohol-related crimes total \$47.8 million; assault accounts for 57.1 percent of the total. Productivity losses due to drug-related crimes total \$128.5 million; larceny theft accounts for 58.1 percent.

5.2.2 INCARCERATION

Criminals who are incarcerated contribute to losses in productivity. Estimations of productivity losses related to incarceration were based on the number of persons incarcerated because of alcohol- or drug-related offenses, the person years served in incarceration, and the average annual earnings for male and female inmates. Table 5.10 and Table 5.11 present, by sex and type of offense, the

Table 5.10
Incarcerations and Person Years Served Associated With Alcohol and Drug Abuse by Type of Offense and Sex, Texas, 1989

Offense	Number of Incarcerations in:				Percent of Offenses Associated With: [2]				Person Years Served Associated With: [3]			
	State Prison		Local Jails [1]		Alcohol Abuse		Drug Abuse		Alcohol Abuse		Drug Abuse	
	Male	Female	Male	Female	Abuse	Abuse	Abuse	Abuse	Male	Female	Male	Female
Homicide	5,408	323	148	9	46.0	13.2	2,515	150	722	43		
Felonious Assault	6,511	134	448	9	26.9	13.2	1,800	37	883	18		
Robbery	8,160	260	651	20	3.9	13.2	328	10	1,111	35		
Burglary	8,726	130	2,557	26	4.7	25.4	458	7	2,476	36		
Larceny Theft	1,605	175	1,258	140	3.8	25.4	80	9	535	59		
Motor Vehicle Theft	1,269	23	797	16	4.6	25.4	73	1	403	7		
Driving Under Influence	341	5	5,311	54	100.0	--	2,465	27	--	--		
Prostitution	12	0	--	--	--	12.8	--	--	2	0		
Drug Laws Violations	5,151	431	827	72	--	100.0	--	--	5,482	460		
Other Offenses	2,728	234	1,772	154	--	--	--	--	--	--		
Total	39,911	1,715	13,769	500			7,720	241	11,615	658		

Notes: [1] The ratios of male to female incarcerations by offenses in local jails are assumed to be the same as those in state prison.
 [2] From Table 5.2.
 [3] Product of the number of incarcerations associated with alcohol/drug abuse and the time served in years. The calendar time served is 1 year for state prisoners and 0.4 year (4.8 months) for local jail inmates.

Sources: 1. Inmates On-Hand 1989 (Texas Department of Corrections).
 2. Jail Population Report (Texas Commission on Jail Standards).
 3. Texas Judicial System: Annual Report for Fiscal Year 1989 (Texas Judicial Council).
 4. Data from the Public Information Office, Texas Department of Corrections.
 5. Profile of Jail Inmates, 1989 (U.S. Department of Justice).

number of incarcerations, person years served, and productivity losses associated with alcohol and drug abuse.

Number of Incarcerees

The number of incarcerated in state prison and local jails shown in Table 5.10 were based on *Inmates On-Hand 1989* (Texas Department of Corrections 1991), *Jail Population Report* (Texas Commission on Jail Standards 1989), and *Texas Judicial System* (Texas Judicial Council 1989). The total number of inmates in state prison in Texas in 1989 was 41,626 (39,911 males and 1,715 females), and male inmates accounted for 90 percent or more in all offense categories.

The *Jail Population Report* gives only the total number of convicted jail inmates (14,269), so the jail inmates by type of offense were derived by applying the data from county-level and district court activity in the Texas Judicial System to total convictions per criminal offense. It was assumed that the percentages of convictions by offenses in court-level activity were the same as those for local jail inmates. The male-female ratios of state prison inmates by offense categories were applied to estimate the number of incarcerations in local jails by sex. As shown in the third and fourth columns of Table 5.10, there were approximately 13,769 male jail inmates and 500 female jail inmates in Texas in 1989.

Incarcerations related to alcohol and drug abuse were determined by multiplying the total number of inmates by the percent of offenses associated with alcohol and drug abuse. These percentages by type of offense are the same causal factors for alcohol- and drug-related crime listed in Table 5.2 and were used in estimations for both men and women.

Time Served by Incarcerees

The amount of time that felons actually serve is typically a fraction of the total sentence they receive. People incarcerated in state prison are more serious criminal offenders and therefore serve longer sentences than those in local jails. The Texas Department of Corrections estimated that in fiscal year 1990, felons sentenced to state prison had an average sentence of nearly 9.4 years but were expected to serve only 20 percent of that sentence, which is about 1.9 years.

From the national report *Profile of Jail Inmates, 1989* (U.S. Department of Justice 1991), the estimated time that all jail inmates were expected to serve was 4.8 months (median) in 1989. Although one-half of local jail inmates received a sentence of 6 months or less, the average (or mean) sentence was considerably longer - 17 months - because of some relatively long sentences received by a small portion of inmates. For driving under the influence, the most common offense type for which

persons are sentenced to local jails, inmates were expected to serve a median of 3.6 months of a 6-month sentence.

Person years served in incarceration were derived by multiplying the number of inmates associated with substance abuse by the time served in years. During the whole year of 1989, the average time served for all state prisoners was 1 year and the median time served by the inmates in local jails was 0.4 year (4.8 months). The last four columns of Table 5.10 present the person years served in 1989 related to alcohol and drug abuse by criminal offense and sex. In Texas in 1989 there were 7,961 years (7,720 for male inmates and 241 for female inmates) of lost productivity due to incarceration associated with alcohol abuse. For drug-related incarceration, that figure was 12,273 (11,615 for male inmates and 658 for female inmates). Homicide accounted for the largest percentage of person years served for alcohol-related incarceration, and drug law violations accounted for the largest percentage of drug-related incarceration.

Value of Productivity Losses

The value of productivity losses due to alcohol- and drug-related incarceration by type of offense and sex is presented in Table 5.11. The losses were calculated by multiplying the substance-related person

years served by the average annual income of legal productivity for each gender group.

Incarceration prevents persons from performing their normal work and household responsibilities, which contributes to productivity losses. Estimates of the value of income earned from legal employment for male inmates are based on the TCADA Prison Survey (TCADA 1988b). The source of the earned income could be from professional, factory work, sales, construction, farm work, or family/friends. The average earned income for Texas male inmates was estimated at \$18,122 in 1989 dollars. In the labor force, the annual earned income for female workers is about 45.3 percent of that for male workers (\$11,801 versus \$26,024). Applying this percentage to annual earned income per male inmate yields an income of \$8,209 per female inmate. The average imputed value of household services, adapted from Table 3.3 of the current study, is \$2,742 for males and \$5,866 for females. Thus, the average annual income in 1989 was \$20,864 per male inmate and \$14,075 per female inmate.

Total incarceration losses associated with alcohol and drug abuse in Texas in 1989 are about \$416.1 million (\$403.4 million for males and \$12.7 million for females). Productivity losses from alcohol-related incarceration amount to \$164.5 million (\$161.1 million for males and \$3.4

Table 5.11
Productivity Losses Due to Incarceration by Type of Offense, Substance Abuse and Sex, Texas, 1989
(\$ in thousands)

Offense	Alcohol Abuse		Drug Abuse		Total	
	Male	Female	Male	Female	Male	Female
Homicide	\$52,471	\$2,115	\$54,586	\$607	\$15,664	\$2,721
Felonious Assault	\$37,548	\$521	\$38,069	\$256	\$18,681	\$777
Robbery	\$6,852	\$147	\$7,000	\$498	\$23,688	\$645
Burglary	\$9,560	\$93	\$9,653	\$502	\$52,165	\$595
Larceny Theft	\$1,671	\$124	\$1,795	\$826	\$11,998	\$949
Motor Vehicle Theft	\$1,524	\$19	\$1,543	\$105	\$8,520	\$124
Driving Under Influence	\$51,438	\$374	\$51,813	--	--	\$374
Prostitution	--	--	--	\$0	\$42	\$0
Drug Laws Violations	--	--	--	\$6,472	\$120,844	\$6,472
Other Offenses	--	--	--	--	--	--
Total	\$161,064	\$3,393	\$164,457	\$9,265	\$251,601	\$12,657
					\$403,401	\$416,058

Notes: 1. The productivity losses are based on the average annual income for male inmates (\$20,864) and for female inmates (\$14,075).
2. Numbers may not add to totals due to rounding.

Source: See Table 5.10.

million for females); homicide represented the largest share (\$54.6 million or 33.2 percent). Productivity losses from drug-related incarceration were about \$251.6 million; drug law violations accounted for \$120.8 million, burglary for \$52.2 million, and robbery for \$23.7 million.

5.2.3 CRIME CAREERS

About 65 percent of “other related indirect costs” is comprised of the “opportunity costs” for individuals who are engaged in drug-related crime careers rather than legitimate employment. “Opportunity costs” represent the loss of the opportunity to use resources for another purpose. Serious drug abuse can cause an individual to forego regular productive efforts and to become involved in selling drugs and committing criminal activities. It was assumed that 50 percent of drug abusers who are not incarcerated for drug-related crime perform criminal activities to support their drug habit (Rice et al. 1990).

Heroin and cocaine, which are highly addictive as well as expensive, are the two major drugs that cause individuals to forego legal employment and thus to generate productivity losses in the form of drug-related crime careers. The estimation of productivity losses was based on the prevalence of frequent heroin and cocaine use by age and sex, the proportions of these populations that were involved in crime

careers (50 percent of non-incarcerees), and the value of the subsequent productivity losses.

Prevalence of Substance-Related Crime

The prevalence of past-month heroin and cocaine abuse in Texas was based on the TCADA Adult Survey (TCADA 1988a). The numbers of past-month heroin and cocaine users were estimated by multiplying the prevalence of use within the past month by the Texas population in 1989 aged 18 and over. The total number of past-month heroin and cocaine users is 125,344 (119,265 cocaine users and 6,079 heroin users). About 64,743 are 18-24 years old, 43,589 are 25-34 years old, and 17,012 are 35 and over.

To estimate the proportion of frequent users who engage in crime careers, the total drug-related incarceration population of 12,273 (both inmates in state prison and local jails) was deducted from the total prevalence of 125,344, leaving 113,071 heroin and cocaine abusers in the “free world.” One-half of the drug abusers not in incarceration (56,536 people) were estimated to be career criminals to finance their drug addiction. The data on state prisoners by age and sex were derived from *Annual Overview 1989* (Texas Department of Criminal Justice 1989). Assuming that the demographic characteristics of inmates

in local jails are the same as those in state prison, the age- and gender-specific data on inmates in local jails can be measured. The first three columns of Table 5.12 present the age and gender distribution of the 56,536 career criminals.

Productivity Losses Due to Substance-Related Crime

Total productivity losses for drug-related crime careers, presented in Table 5.12, are estimated at \$1,075 million (\$968 million for males and \$107 million for females). By age group, \$408 million (37.9 percent) is incurred by people 18-24 years old, \$449 million (41.8 percent) by those 25-34, and \$219 million (20.3 percent) by those 35 and over. The productivity loss figures were derived by multiplying the number of people forgoing legal activities by the appropriate mean annual earnings. The mean annual earnings by age and sex are allocated on the basis of salary income and net income of year-round full-time workers, which are from *Detailed Population Characteristics, Texas 1980 Census of Population* (U.S. Department of Commerce 1983). These annual earnings were updated to 1989 by the 61.3 percent increase of Texas manufacturing average earnings.

Table 5.12
Productivity Losses for Drug Abuse Related Crime Careers by Age and Sex, Texas, 1989

Age	Number of Persons Forgoing Legitimate Productive Pursuits [1]			Mean Annual Earnings [2]		Productivity Losses (\$ in thousands)		
	Male	Female	Total	Male	Female	Male	Female	Total
18-24	25,852	5,117	30,970	\$13,894	\$9,463	\$359,194	\$48,426	\$407,620
25-34	15,291	3,654	18,945	\$25,908	\$14,446	\$396,158	\$52,780	\$448,938
35+	6,246	375	6,621	\$34,058	\$15,419	\$212,736	\$5,779	\$218,515
Total	47,390	9,146	56,536	--	--	\$968,088	\$106,986	\$1,075,074

Notes: [1] The number is 50 percent of the difference between the total cocaine/heroin abusers and the persons incarcerated in state prison and local jails for drug abuse.

[2] Based on salary income and net income from farm and nonfarm self-employment for year-round full-time workers.

Sources:

1. TCADA Adult Survey (Texas Commission on Alcohol and Drug Abuse).
2. Annual Overview 1989 (Texas Department of Criminal Justice, Institutional Division).
3. Data from the Bureau of State Health Data and Policy Analysis, Texas Department of Health.
4. Population Characteristics, Texas 1980 Census of Population (U.S. Department of Commerce, Bureau of the Census).

CHAPTER VI - COSTS FOR SPECIFIC DISEASE GROUPS

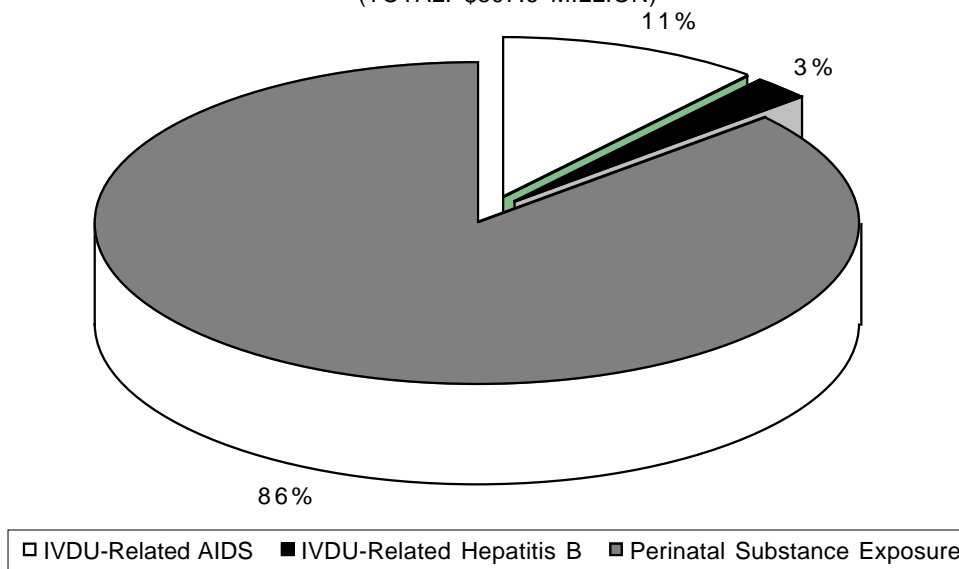
Costs related to three specific disease groups associated with substance abuse are discussed in this chapter: acquired immunodeficiency syndrome (AIDS), hepatitis B, and perinatal substance exposure. These disease groups cost Texans \$507.6 million in 1989. Of the total amount, \$438.0 million (86.3 percent) is for perinatal substance exposure, \$56.1 million (11.0 percent) is for IVDU-related AIDS, and \$13.5 million (2.7 percent) is for IVDU-related hepatitis B (Figure 6.1).

6.1 IVDU-RELATED AIDS

Previous Studies

The AIDS epidemic has imposed significant economic stress on both individual patients and on the health care system because AIDS is an expensive illness with complex treatment demands. One frequently-cited estimate of the lifetime health care costs of patients with AIDS sets the hospital expenditures at \$147,000 per AIDS patient (Hardy et al. 1986).

FIGURE 6.1 ECONOMIC COSTS OF IVDU-RELATED AIDS, IVDU-RELATED HEPATITIS B, AND PERINATAL SUBSTANCE EXPOSURE IN TEXAS, 1989 (TOTAL: \$507.6 MILLION)



However, more recent studies of lifetime average costs cite considerably lower estimates. One study estimated that during the median survival period of one year, the medical costs of treating AIDS ranged from \$27,000 to \$64,000 per patient in 1987 (Arno and Green 1990). A two-year cost study of 240 AIDS patients estimated the overall lifetime hospital costs per patient per year at \$34,229 in year one and \$42,399 in year two (Seage et al. 1990).

Another study estimated that in 1990 the one-year cost of treating a person with AIDS (PWA) was \$32,000 and the lifetime medical care cost of treatment was about \$85,333, assuming an average survival time of 20 months with a consistent level of care (Hellinger 1991). However, lifetime costs continue to increase as the survival period lengthens and the use of expensive drugs, such as azidothymidine (AZT) and aerosol pentamidine, continues to spread.

Cost Estimate for Texas, 1989

As of May 17, 1991, the Texas Department of Health reported that of the 12,659 cumulative number of AIDS cases diagnosed, 908 were intravenous (IV) drug users. About 81 percent of the IV drug users were males. During 1989, there were 2,597 AIDS cases diagnosed in Texas, 231 of which were IV drug users (194 males and 37 females).

The estimate for AIDS in this study includes the costs of treating all PWAs

during a given year, including PWAs diagnosed in previous years. The Center for Disease Control (CDC) estimated in 1989 that the ratio of PWAs alive with AIDS during any part of the year to the PWAs diagnosed during that year was about 2.02 (CDC 1990b). Therefore, the total number of PWAs in Texas in 1989 was about 5,246, of which approximately 467 were IV drug users (392 males and 75 females). The estimates for both direct and indirect costs of IVDU-related AIDS in Texas in 1989 are presented below:

<u>Type of Cost</u>	<u>Total</u> (thousands)	<u>Male</u> (thousands)	<u>Female</u> (thousands)
Total	\$ 56,054	\$ 49,691	\$ 6,363
Direct	12,645	10,614	2,031
Personal Medical	12,435	10,438	1,997
Nonpersonal	210	176	34
Indirect	43,409	39,077	4,332
Morbidity	7,561	6,766	795
Mortality*	35,848	32,311	3,537

* 4 percent discount rate.

Although the primary connection between AIDS and drug abuse in 1989 was needle-sharing, trends in the incidence of AIDS since 1989 indicate the emergence of a second deadly connection: AIDS is increasingly being transmitted among people who exchange sex for drugs, or who otherwise have unprotected sex while under the influence of drugs.

Direct Costs

Direct costs include personal medical care (hospital services, physician inpatient and outpatient services, drugs, and outpatient ancillary services) and nonpersonal costs (funds for prevention education, testing/counseling, research, support services, and administrative activities).

Starting with the dollar amount of \$32,000 per case (Hellinger 1991) and adjusting medical costs down to 1989 dollars (9.0 percent) yields an estimated medical care cost of \$29,358 to treat a PWA alive during any part of 1989. Since the health care expenses per person in Texas are about 90.7 percent of those in United States (AHA 1990), the AIDS medical costs in Texas were adjusted accordingly. Thus, total direct personal medical costs of AIDS for 467 IV drug users in Texas was estimated at \$12.4 million.

The total non-Medicaid funds expended for AIDS programs in Texas in 1989 were about \$2.34 million (Rowe and Keintz 1989). Since IV drug users are nearly 9 percent of all AIDS cases, the estimated direct nonpersonal costs for IV drug users amounts to \$210,291.

Indirect Costs

Indirect costs of IV drug-related AIDS include morbidity (work losses due to human immunodeficiency virus (HIV) illness) and mortality (productivity losses

due to premature death of PWAs). It is assumed that a person with AIDS or AIDS-related complex (ARC) would be too ill to work 60 percent of the time if that person was alive at the end of a year (Scitovsky and Rice 1987). The 1989 average annual income equals \$28,766 for each man and \$17,667 for each woman. Thus, the total morbidity cost for those 467 IV drug users amounts to \$7.6 million.

A total of 1,449 people died from AIDS in Texas in 1989 (1,389 men and 60 women), 113 of which were IV drug users (92 men and 21 women). Applying the present value of expected future lifetime earnings in Chapter IV, the productivity losses due to IV drug-related AIDS deaths are \$35.8 million (\$32.3 million for men and \$3.5 million for women).

6.2 IVDU-RELATED HEPATITIS B

A blood-borne infection, hepatitis B can be spread by needle-sharing among IV drug users. A total of 1,853 hepatitis B cases was reported in Texas in 1989. About 73 percent of the cases occurred in persons 15-39 years of age. According to the *Hepatitis Surveillance Report* (CDC 1990d), IV drug users accounted for 24.6 percent of the nationwide hepatitis B cases in 1988. Applying this percentage to 1989 Texas figures translates to an estimate of 456 IVDU-related hepatitis B cases, the majority of which (62 percent) were males.

The direct and indirect costs of IV drug-related hepatitis B in Texas, 1989, are estimated in the following table:

Type of Cost	Total (thousands)	Male (thousands)	Female (thousands)
Total	\$ 13,515	\$ 9,831	\$ 3,684
Direct	4,558	2,809	1,749
Indirect	8,957	7,022	1,935
Morbidity	4,135	2,991	1,144
Mortality *	4,822	4,031	791

* 4 percent discount rate.

Based on estimates from the Texas Medical Foundation, the average length of hospital stay for those patients with hepatitis B in Texas is about 10.4 days, and the average charge per patient day is \$961.18 in 1989 dollars. The annual direct hospital cost is about \$9,996 per case, or \$4.6 million, for those 456 drug-related cases of syrum B hepatitis.

One study that explored the effects of poor health on earnings and labor force behavior found that the average disabled man aged 18 to 64 years suffers a 37 percent reduction in yearly earnings (Luft 1975). Applying this impairment rate to the number of hepatitis B cases in Texas in 1989 yields an income loss of \$10,643 per male and \$6,537 per female. Therefore, total morbidity costs for the hepatitis B drug users are about \$4.1 million (\$3.0 million for 281 male drug users and \$1.1 million for 175 female drug users).

Sixty-one hepatitis B deaths (44 males and 17 females) were reported in 1989. The males who died from hepatitis B ranged in age from 20-89 years; the mean age was 54.2 years. For females, the deaths ranged in age from 24-84 years and the mean age was 51.1 years. An estimated 30 percent of viral hepatitis deaths are attributable to drug abuse (Ravenholt 1984). Applying this percentage yields 18 hepatitis B deaths (13 men and 5 women) due to drug abuse in Texas in 1989. Application of a 4 percent discount rate results in the mortality costs of \$4 million for males and \$0.8 million for females.

6.3 PERINATAL SUBSTANCE EXPOSURE

Maternal use of alcohol and other drugs during pregnancy is related to intrauterine growth retardation, the consequences of which can incur significant economic cost. Cocaine use, for example, can constrict placental blood flow and cause poor fetal growth and development, resulting in decreased birth weight, length, and head circumference compared to the infants of drug-free mothers. Some infants with developmental and neurological problems will require a lifetime of costly medical care and special education.

Cost Estimate for Texas, 1989

The Texas Commission on Alcohol and Drug Abuse sponsored a postpartum survey of 1,401 pregnant women who gave birth at one of the six largest public hospitals in Texas (TCADA 1991). By design, the postpartum survey over-sampled racial/ethnic minorities, younger age groups, and lower income families. The weights for the sample were computed by comparing the distribution of ethnicity and age in the sample to Texas Department of Health live births data for 1989. The final estimates were then adjusted by these weights to reflect the actual demographic characteristics of the annual births. Based on self-reported data on substance use, 339 infants were born to mothers who used alcohol and/or illicit drugs during pregnancy. Of the 339 infants, 72.6 percent (246 infants) were alcohol-exposed, 8.3 percent (28 infants) were (illicit) drug-exposed, and 19.2 percent (65 infants) were exposed to both alcohol and illicit drugs. The 339 babies comprised 24.2 percent of the total sample. Applying this ratio to all live births in Texas in 1989, an estimated 74,463 infants were born to mothers who used substances during pregnancy (54,035 alcohol-exposed, 6,150 drug-exposed, and 14,278 exposed to both alcohol and drugs). An infant was considered substance-exposed if the mother reported any use of alcohol or illicit drugs during pregnancy, regardless of the amount or frequency.

The total economic costs of perinatal substance exposure in Texas in 1989 were estimated at \$438.0 million (Table 6.1). Of this total amount, 80.7 percent (\$353.3 million) is from alcohol exposure, 5.8 percent (\$25.5 million) is from drug exposure, and 13.5 percent (\$59.2 million) is from combined alcohol and drug exposure. Fetal Alcohol Syndrome (FAS) alone accounts for 30.0 percent (\$131.4 million) of the total amount.

Fetal Alcohol Syndrome (FAS)

One extreme result of perinatal alcohol exposure is Fetal Alcohol Syndrome (FAS), which occurs in children born to women who drink excessively during pregnancy. The common signs of FAS are prenatal and postnatal growth deficiency, developmental delay or mental retardation, fine motor dysfunction, and a characteristic facial dysmorphism.

Not all women who drink alcohol heavily during pregnancy deliver babies with FAS. Early reports suggested incidence rates of FAS in the range of 1 to 3 cases per 1,000 live births. One study indicates that the worldwide incidence of FAS is 1.9 per 1,000 live births (164 identified FAS cases out of a total number of 88,236 live births), and also indicates that estimates vary depending on whether the study was conducted prospectively or retrospectively (Abel and Sokol 1987). Retrospective incidence estimates average

Table 6.1
 Estimated Cases and Economic Costs of Perinatal Substance Exposure, Texas, 1989
 (\$ in thousands)

	Alcohol Exposure		Drug Exposure	Combined Alc&Drug Exposure	Total
	FAS	Non-FAS			
Total Cases	584	53,451	6,150	14,278	74,463
Total Costs	\$131,361	\$221,923	\$25,507	\$59,212	\$438,002
Intensive Care Costs	--	\$198,769	\$22,871	\$53,094	--
Foster Care Costs	--	\$23,153 [1]	\$2,635	\$6,118	--

Note: [1] May include the foster care infants with FAS.

- Sources:
1. "Incidence of FAS and Economic Impact of FAS-Related Anomalies" (Abel and Sokol).
 2. Texas Vital Statistics 1989 (Texas Department of Health).
 3. 1990 Texas Survey of Postpartum Women and Drug-Exposed Infants (Texas Commission on Alcohol and Drug Abuse).
 4. "Drug-Exposed Infants: A Generation at Risk" (U.S. General Accounting Office).
 5. "Crack Children in Foster Care" (Besharov).

2.9 per 1,000 live births whereas prospective estimates average 1.1 per 1,000 live births. Using the incidence rate of 1.9 per 1,000 live births, an estimated 584 infants were born in Texas in 1989 with FAS.

An estimated \$1.6 billion was spent nationally on 7,024 FAS cases in 1985 to provide neonatal intensive care, some surgical correction and subsequent treatment, and treatment for FAS-induced mental impairment (Abel and Sokol 1987). The largest part of this amount (80

percent) was for residential care for individuals over age 21 with mental retardation due to FAS.

Adapting the 1985 cost estimate and updating it to 1989 dollars yields an estimate of \$1.86 billion for 7,484 FAS cases in the United States (\$247,996 per FAS case). Because the health care expenses per person in Texas are about 90.7 percent of the United States average (AHA 1990), the FAS costs in Texas are adjusted down, giving an estimated cost of \$131.4 million for 584 FAS cases in Texas in 1989.

Alcohol- and Drug-Exposed Infants: Intensive Care Costs

In addition to the 584 infants with FAS in Texas in 1989, there were 53,451 non-FAS alcohol-exposed infants, 6,150 drug-exposed infants and 14,278 infants exposed to both alcohol and drugs. Table 6.1 presents the estimated economic costs of perinatal substance exposure in Texas in 1989. To measure the economic effects of perinatal substance exposure, only the marginal costs are counted (i.e., the additional costs required to care for substance-exposed infants above those costs associated with non-exposed infants).

The actual costs of hospitalization for low birthweight and preterm infants due to prenatal substance exposure vary depending on how one establishes the effect of substance use on birth weight. The U.S. Office of Technology Assessment reported in 1987 that the average cost of neonatal intensive care for an infant weighing less than 1,500 grams ranges from \$27,000 to \$60,000, and the average cost for an infant weighing from 1,500 grams to 2,500 grams ranges from \$12,000 to \$39,000 (USOTA 1987). The U.S. General Accounting Office reported that the median costs for newborn medical care were \$4,100 higher for drug-exposed infants than for infants not exposed to drugs (\$5,500 versus \$1,400 in 1989) (GAO 1990). Adjusting this figure to the Texas level yields a cost of \$3,718.70 for

the intensive care hospital stay for each substance-exposed infant, which translates to \$198.8 million for non-FAS alcohol-exposed infants, \$22.9 million for drug-exposed infants, and \$53.1 million for infants exposed to both alcohol and drugs.

Alcohol- and Drug-Exposed Infants: Foster Care Costs

Because of the chaotic and precarious home environment that accompanies parental substance abuse, a substantial proportion of substance-exposed infants are reported to the social welfare system for foster care placement. The American Public Welfare Association estimates that the number of substance-exposed infants placed in foster care in Texas rose 15.2 percent between 1986 to 1988 (from 4,727 to 5,449) (Besharov 1990). Projecting this figure to 1989 by applying an average annual increase rate of 7.6 percent means that an estimated 5,863 substance-exposed infants born in Texas in 1989 were placed in foster care. On the national level, the cost of one year of foster care is about \$6,000 per child (GAO 1990). Adjusting the estimate to the state level yields a cost of \$5,442 per child in Texas. Multiplying \$5,442 by 5,863 yields a total foster care cost for Texas in 1989 of \$31.9 million (approximately \$23.2 million for alcohol-exposed infants, \$2.6 million for drug-exposed infants, and \$6.1

million for infants exposed to both alcohol and drug abuse).

**Perinatal Substance Exposure:
Costs Not Included**

Expenditures on substance-exposed infants can be expected to continue, in the form of further medical care and special education needs, because of these infants' neurological and other developmental problems. For example, the Florida Department of Health and Rehabilitative Services estimated that for those drug-exposed infants who show significant physiologic or neurologic impairment, total long-term service costs up to age 18 could be as high as \$750,000 (GAO 1990). Nevertheless, because of the unknown frequency with which substance-exposed infants will suffer these problems later in life and the uncertainty of the long-term results of prenatal substance exposure, the future costs of caring for these infants were not included in the present cost analysis.

Since most treatment programs do not provide child care or allow children to stay with their mothers during treatment, existent services do not meet the need for substance-addicted women with children. In 1989, only 4 treatment programs in Texas admitted women with their children. According to a TCADA cost report, the average residential treatment cost for a

mother/infant dyad was about \$154.44 per day in 1989. Based on a TCADA telephone survey, the average length of inpatient stay is about 8 months (or 240 days) for treatment programs accepting women with children. Therefore, for 74,463 mother/infant dyads that were in need of treatment, the total needed but not available residential substance abuse treatment would amount to \$2.76 billion.

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APPENDIX A - COMPARISON WITH PREVIOUS COST STUDIES

Table A.1 presents a brief historical comparison of six studies that estimated economic costs of substance abuse for the United States and for Texas. For Texas, the total economic costs of alcohol and drug abuse were estimated at \$11.2 billion in 1984 and \$12.6 billion in 1989, which is 12.8 percent higher. However, the current 1989 estimates and the 1984 estimates reported by Harwood and associates (1986) for Texas used different methodologies and data sources. The 1989 study utilized the most current and reliable data available and a new methodology developed primarily from the 1985 national study. Comparison of the 1980 national study estimates and the 1985 national study estimates shows different cost trends. The 1985 national study by Rice and associates (1990) estimated a total cost of \$114.4 billion, which is 16.2 percent lower than the \$136.5 billion estimated in the 1980 national study by Harwood and associates (1984). Since the differences between estimates in the 1984 and 1989 Texas studies, and the 1980 and 1985 national studies, are primarily due to methodology and sources of data, **one cannot conclude that the differences in these estimates reflect changes in actual costs.**

A.1 DIFFERENCES BETWEEN 1985 NATIONAL AND 1989 TEXAS STUDIES

The current 1989 Texas study most closely follows the methodology of Rice's 1985 national study. However, the Texas 1989 study differs from the national 1985 in three primary ways: the approach in estimating treatment costs, the measure of morbidity prevalence, and the addition of "drug-exposed infants" costs and drug abuse costs for motor vehicle crashes to the 1989 study. To estimate treatment costs, the national 1985 study used all documented primary and secondary alcohol/drug abuse diagnoses, and conducted a comorbidity methodology for short-stay hospitals that identified the additional days of care for patients with secondary alcohol/drug abuse diagnoses. Due to the unavailability of the hospital discharge data of primary and secondary alcohol/drug abuse diagnoses in Texas, the 1989 Texas study used a direct approach of estimation based on the National Drug and Alcoholism Treatment Unit Survey (NDATUS), which provides data on actual alcohol/drug abuse clients. The costs per patient day/hour were then applied to the estimation.

Table A.1
 Historical Comparison of Economic Cost Estimates in U.S. and Texas
 (\$ in millions)

Estimated Costs for U.S.:			
Year	Total	Alcohol Abuse	Drug Abuse
1977 [1]	\$65,761	\$49,374	\$16,387
1980 [2]	\$136,462	\$89,526	\$46,936
1985 [3]	\$114,390	\$70,338	\$44,052

Estimated Costs for Texas:				
Year	Total	Alcohol Abuse	Drug Abuse	Combined Alc&Drug Abuse
1981 [4]	\$4,573	\$4,573	--	--
1984 [5]	\$11,159	\$8,194	\$2,966	--
1989	\$12,590	\$7,889	\$3,654	\$1,047

Notes: [1] Cruze and associates (1981).
 [2] Harwood and associates (1984).
 [3] Rice and associates (1990).
 [4] Harwood and Kristiansen (1983).
 [5] Harwood and associates (1986).

The type of morbidity prevalence measure in the 1985 national study is a diagnostic measure defined in terms of a clinical criteria for a medical diagnosis of alcohol/drug abuse. However, the 1989 Texas study used a problem measure to estimate the prevalence of substance abuse. This measure is a dichotomous variable which takes on the value of 1 if the survey respondent answers affirmatively to 2 or more of the 19 alcohol-related problems (or any of the 17 drug-related problems) (see Appendix B). The prevalence rate is then the number of alcohol/drug problem users divided by the corresponding total population.

A.2 DIFFERENCES BETWEEN 1984 AND 1989 TEXAS STUDIES

Table A.2 details the cost estimates of alcohol and drug abuse, by type of cost and by disorder, for the 1984 Texas study and the 1989 Texas study. The 1989 total estimate is 12.8 percent higher than the 1984 estimate (\$12.6 billion versus \$11.2 billion); the 1989 core cost is 3.5 percent lower than the 1984 core cost; the “other related” costs are 58.2 percent higher in the 1989 study than in the 1984 study.

Core Costs

The 1989 treatment costs are 25.7 percent lower than the 1984 results (\$695 million versus \$935 million). The 1989 study derived the number of alcohol and

drug abuse clients by age and by type of treatment ownership from NDATAUS for Texas (TCADA 1990c). The appropriate client fees per day/hour and average length of stay for alcohol and drug abuse treatment were used to calculate the statewide treatment costs. The 1984 study, on the other hand, prorated the estimated national costs of treatment to Texas and assumed that costs of alcohol/drug abuse-specific medical care services were some proportion of the total health care services expenditures for every person.

Total morbidity costs of alcohol and drug abuse estimated in the 1989 study are 15.9 percent lower than the 1984 estimates (\$5.6 billion compared to \$6.7 billion). To estimate reduced productivity, the 1989 study applied a regression analysis for the indicator model to measure the gender-specific impairment coefficients of labor participants due to alcohol and drug disorders; the income losses and total alcohol and drug problem users from the TCADA Adult Survey (TCADA 1988a) were taken into account in the estimation. Different impairment rates were specified in the 1984 study; the national expected percentage of impairment in productivity was used (i.e., 21 percent for alcohol abuse and 27.9 percent for drug abuse for both males and females). In 1984 estimates, the prevalence rates for alcohol/drug abuse from the national cost study were adjusted to Texas. The 1984 morbidity costs might

Table A.2
 Economic Costs of Alcohol and Drug Abuse by Type of Cost, Texas, 1984 and 1989
 (\$ in millions)

Type of Cost	1984 [1]			1989 [2]			Combined Alc&Drug Abuse
	Total	Alcohol Abuse	Drug Abuse	Total	Alcohol Abuse	Drug Abuse	
Total	\$11,159	\$8,194	\$2,966	\$12,590	\$7,889	\$3,654	\$1,047
Core Costs	\$9,029	\$7,242	\$1,787	\$8,710	\$6,586	\$1,137	\$987
Direct	\$935	\$863	\$71	\$695	\$268	\$428	--
Treatment	\$935	\$863	\$71	\$695	\$268	\$428	--
Indirect	\$8,094	\$6,379	\$1,716	\$8,015	\$6,319	\$709	\$987
Morbidity	\$6,698	\$5,159	\$1,539	\$5,632	\$4,272	\$373	\$987
Mortality	\$1,397	\$1,220	\$177	\$2,383	\$2,046	\$337	--
Other Related Costs	\$2,131	\$952	\$1,178	\$3,372	\$949	\$2,422	\$0.4
Direct	\$1,196	\$640	\$556	\$1,705	\$737	\$967	\$0.4
Indirect	\$935	\$312	\$622	\$1,667	\$212	\$1,455	--
Special Disease Groups	--	--	--	\$508	\$353	\$95	\$59

Sources: [1] The Economic Costs of Alcohol and Drug Abuse in Texas, 1984 (Harwood et al.).
 [2] Based on Table 1.1 of the current study.

have been overestimated partly because of the included value of productivity losses for FAS (Fetal Alcohol Syndrome) victims. Since the working span and lifespan of persons with FAS is unknown and unavailable, the inclusion of estimated productivity impairment due to FAS would lead to overestimation of morbidity costs.

The 1989 mortality costs due to substance abuse are estimated at \$2.4 billion, which is 70.6 percent higher than the 1984 estimates (\$1.4 billion). The difference between 1984 and 1989 drug-related mortality costs (90.4 percent) is much greater than the difference in alcohol-related costs (67.7 percent). Both studies used a similar methodology, but inflation increases, prevalence increases (resulting from different definitions of alcohol/drug abuse deaths), and changes in present value of future lifetime earnings contributed to the higher mortality cost in 1989.

Other Related Costs

“Other related costs” were projected as \$3.4 billion in Texas in 1989, whereas the 1984 study estimated \$2.1 billion (36.8 percent less). Compared to 1984 results, the 1989 estimates are 0.3 percent lower for alcohol abuse and 106 percent higher for drug abuse. The differences between the two years are due to inflation and changes in data sources, especially the

different specifications of the “causal factors” for substance-related crime. The criminal causal factors associated with drug abuse were derived from the TCADA Prison Survey (TCADA 1988b) for the current study, whereas the 1984 study adjusted national data to Texas. In addition, the 1989 estimates include the motor vehicle crash costs for drug abusers and for combined alcohol and drug abusers, which were not available for the 1984 study. The Texas private legal defense expenditures related to alcohol and drug abuse for 1989 were adjusted from the national data of total annual payroll for legal services; the 1984 study used a percentage of the amount spent for public defense to estimate the private crime-related costs.

One important addition to the 1989 study is the cost estimates for special disease groups. This cost category includes IVDU-related AIDS, IVDU-related hepatitis B, and perinatal substance exposure. Compared to the 1984 estimates, the additional costs for special disease groups in Texas in 1989 were estimated at \$508 million.

APPENDIX B - ALCOHOL AND DRUG PROBLEM QUESTIONS

The following questions are from the TCADA Adult Survey, conducted in the spring of 1988:

(A) Alcohol-Related Problems

1. Felt aggressive or cross while drinking
2. Got into heated argument while drinking
3. Stayed away from work or school because of hangover
4. Were "high" or "tight" when on the job or at school
5. Lost or nearly lost job because of drinking
6. Spouse or girl/boyfriend urged to cut down on drinking
7. Other relative urged to cut down on drinking
8. Friend(s) urged to cut down on drinking
9. Skipped a number of meals while drinking
10. Tossed down several drinks fast for a quicker effect
11. Afraid were or might become alcoholic
12. Stayed drunk for two or more days in a row
13. Difficulty stopping drinking before completely drunk
14. Unable to remember things done while drinking
15. Had a quick drink or so while no one was looking
16. Took a drink first thing in the morning
17. Hands shook quite a lot after drinking the day before
18. Got "high" or "tight" while drinking by oneself
19. Kept on drinking after promising self not to

(B) Drug-Related Problems:

1. Became depressed or lost interest due to drugs
2. Arguments/fights with family/friends due to drugs
3. Trouble at school or on the job due to drugs
4. Driven unsafely due to drugs
5. Could not remember what happened due to drugs
6. Felt completely alone and isolated due to drugs
7. Felt nervous and anxious due to drugs
8. Health problems caused by drug use
9. Difficulty thinking clearly due to drugs
10. Serious money problems due to drugs
11. Felt irritable and upset due to drugs
12. Done less work than usual due to drugs
13. Felt suspicious and distrustful of people due to drugs
14. Trouble with the police due to drugs
15. Skipped four or more regular meals in a row due to drugs
16. Found it harder to handle problems due to drugs
17. Had to get emergency medical help due to drug use

APPENDIX C - ESTIMATION OF ALCOHOL AND DRUG ABUSE IMPAIRMENT RATES

C.1 SPECIFICATION OF THE REGRESSION EQUATION

The regression analysis was based on the indicator model that applies dichotomous measures of individual prevalence. The specification of the multiple regression equation is as follows:

$$\ln Y = \alpha + \beta X + \gamma \text{ALCO} + \delta \text{DRUG} + \theta \text{ALDR} + \varepsilon ,$$

where $\ln Y$ is the natural logarithm of the dependent variable Y (family income before taxes), X is a vector of demographic variables that include age, marital status, sex, number of children, race, and education level, ALCO is the alcohol-abusing indicator, DRUG is the drug-abusing indicator, ALDR is the combined alcohol and drug-abusing indicator, and ε is the error term. The study attributes all of the statistical relationship between alcohol/drug abuse and income to the effect of alcohol/drug abuse on income, and ignores the effect of income on substance abuse. This overstates the income depressive effects of alcohol/drug abuse.

Since it is assumed that the independent variables have proportional effects on income, the dependent variable (income) is measured logarithmically. The

TCADA Adult Survey (TCADA 1988a) provides self-reported measures of total family income before taxes, within 6 brackets, from under \$10,000 to \$50,000 and over. The family income is then used as the proxy variable for the dependent variable. For each bracket, the mean value is taken as the measurement of income variable. Thus, the six possible income levels are \$5,000, \$15,000, \$25,000, \$35,000, \$45,000, and \$55,000. The analysis is performed on individuals aged 18 and over in the labor market for those employed as well as those unemployed at the time of the survey. Of the total 3,410 sample observations, 213 did not reveal their income levels. Since income is the dependent variable, these 213 observations were dropped. Observations missing the necessary data were also omitted.

C.2 MEASUREMENT OF INDEPENDENT VARIABLES

Age

Age, other variables being constant, is expected to have a positive, yet, after some point, negative effect on income. To show the concave shape, the standard quadratic relationship between age and income is necessary. Both age (AGE) and the square

of age (AGE*AGE) are included to allow for the traditional inverted U-shaped curve with respect to earned income and labor force participation.

Marital Status/Sex

Four mutually-exclusive dummy variables were created to represent the sex and marital status of individuals in the labor force. They are married males, married females (MFEMALE), non-married males (SMALE), and non-married females (SFEMALE). The latter three variables are included on the right-hand side of the income equation. The non-married individuals consist of those widowed, divorced, separated, and never married. Relative to married persons, it is expected that the income effects of non-married persons would be negative. Because of the addition of spouse income, married persons would report higher family income than the non-married. For some housekeeping women who had worked before marriage, the total family income after marriage would be still higher than those before marriage since male earnings are usually the major sources of family income and are on average higher than female earnings.

Number of Children Under 12

The respondents were asked how many children under the age of 12 lived in the household. The CHILD12 variable in the regression represents the total number of

children in the household under the age of 12. The regression coefficient of CHILD12 could be positive or negative. On personal income, the number of children is expected to have a positive effect for men and a negative effect for women. Men would earn more income to support more children in the household. However, the larger the number of children, the more time the women would likely spend at home to take care of them. Hence, on total family income, the influence of CHILD12 would be vague depending on the number of household members in the labor market.

Race

Four mutually-exclusive dichotomous variables for racial characteristics were created: white, black (BRACE), Hispanic (HRACE), and other (ORACE). The latter three variables are included in the regression. Compared to white persons, the non-white races on average have lower income levels. The coefficients of these three race variables are expected to be negative.

Education Level

The survey provided the information on an individual's last completed grade in school (for example, code 12 is for high school graduate and code 16 is for college graduate). The EDUCAT variable in the regression is the number of years of educational attainment. The higher the

education level, the higher the productivity will be — hence, the higher the income level. The effect of EDUCAT on income would be positive.

Region

Because the survey took place in eight regions of the state, the estimation of an income equation required some control for this design. There are eight mutually-exclusive dichotomous variables: AREA1 (Plains Region), AREA2 (Border Region), AREA3 (Dallas/Fort Worth Region), AREA4 (Eastern Region), AREA5 (Houston Region), AREA6 (Central Region), AREA7 (San Antonio Region), and AREA8 (Corpus Christi Region). Since these eight variables are mutually exclusive, one must be excluded from the regression. AREA3 was taken as the excluded variable. Coefficients on all seven remaining variables are expected to be negative because the Dallas/Fort Worth Region is a wealthy district.

Alcohol and Drug Disorders

The three dichotomous indicators of ALCOABUSE, DRUGABUSE, and ALDRABUSE are the disorder variables in the regression. ALCOABUSE is equal to 1 for a person with alcohol disorder and 0 otherwise; DRUGABUSE is equal to 1 for a person with drug disorder and 0 otherwise; and ALDRABUSE is equal to 1

for a person with both alcohol *and* drug disorder and 0 otherwise. The approach for measuring the disorder indicators is a “problem measure.” The TCADA Adult Survey provided 19 yes/no questions about drinking experience and 17 yes/no questions about drug-using problem. These questions are presented in Appendix B. The ALCOABUSE variable takes on a value of 1 if the respondent answered yes to 2 or more of the 19 problem-drinking questions; otherwise, it takes on the value of 0. The DRUGABUSE variable takes on a value of 1 if the respondent answered yes to any one of the 17 drug-related problems; otherwise, it takes on the value of 0. And, the ALDRABUSE variable takes on a value of 1 if the respondent answered yes to 2 or more of the drinking questions *and* to any of the drug-related problems; otherwise, it takes on the value of 0. To increase the number of observations and improve the precision of regression, it is assumed that those who did not respond to the drug-related questions do not have any drug-using problems and are assigned the value of 0.

Workers who are alcohol/drug abusers would mostly generate reduction in productivity. The income levels are relatively lower for alcohol/drug-abusing persons than for non-abusing persons. The relationship between ALCOABUSE and income (or DRUGABUSE and income, or

ALDRABUSE and income) is expected to be negative. It is noted that the dependent variable (income) is a natural logarithm. To obtain the percent loss of income (i.e., the impairment rate) due to alcohol/drug abuse, the regression coefficient of the dummy disorder variable has to be transformed by using the following expression:

$$\text{antilogarithm}_e (\text{coefficient}) - 1 .$$

This transformation has the impact of exponentially lowering negative and increasing positive coefficient values.

C.3 ESTIMATION RESULTS

The estimation results of the income regression for Texas in 1989 are presented in Table C.1. The cross section data is based on the TCADA Adult Survey. The WLS (weighted least squares) technique is used for the estimation. The weight variable is to correct for the imperfect population sampling representation of Texas individuals by age, race and region. As the table shows, the overall performance of the estimation is quite good. All regression coefficients have the expected signs and most of them are highly significant. For interpretations of the actual values of the coefficients, it is important to understand that they are exponents because

the dependent variable is a natural logarithm.

The coefficients of AGE and AGE*AGE variables indicate the expected signs, with the AGE variable positive and the AGE*AGE variable negative for all labor force participants. The coefficient of AGE presents the first-order effect of age on income and is significant at 5 percent level.

The effect of sex and marital status on family income is positive for MFEMALE, negative for SMALE, and negative for SFEMALE, as expected. All of the coefficients except MFEMALE are highly significant. For non-married males in the included sample, family incomes are about 26 percent lower than those of the married males. On the other hand, the family incomes are 42 percent higher for married females than for non-married females in the estimation.

The number of children under 12 (CHILD12) appears to yield a strongly negative effect on family income. For the dichotomous race variables (BRACE, HRACE, and ORACE), all coefficients have the expected negative signs. Both BRACE and HRACE generate quite significant effects. The education level (EDUCAT) has a very significant and positive effect on family income. All of the dichotomous region variables (AREA1, AREA2, AREA4, AREA5, AREA6,

Table C.1
Regression Estimates of Alcohol and Drug Abuse Income Effects, Texas, 1989

<u>Variable</u>	<u>Regression Coefficients</u>	<u>Variable</u>	<u>Regression Coefficients</u>	<u>Impairment Rates</u>
Intercept	9.1974 [61.891]**	AREA1	-0.1669 [-3.322]**	
AGE	0.0141 [2.029]*	AREA2	-0.2913 [-4.974]**	
AGE*AGE	-0.0001 [-1.406]	AREA4	-0.2389 [-3.756]**	
MFEMALE	0.0281 [0.726]	AREA5	-0.0625 [-1.782]	
SMALE	-0.2983 [-7.698]**	AREA6	-0.2138 [-4.594]**	
SFEMALE	-0.4904 [-13.157]**	AREA7	-0.0745 [-1.455]	
CHILD12	-0.0550 [-3.383]**	AREA8	-0.1062 [-1.509]	
BRACE	-0.2434 [-5.190]**	ALCOABUSE	-0.1212 [-3.761]**	-11.42%
HRACE	-0.1160 [-2.906]**	DRUGABUSE	-0.0926 [-0.897]	-8.84%
ORACE	-0.1196 [-1.558]	ALDRABUSE	-0.1549 [-2.431]*	-14.35%
EDUCAT	0.0769 [16.169]**	Adj R-square	0.3346	

- Notes:
1. The figures in brackets are the statistical t-values.
 2. ** indicates the 1% significant level and * the 5% significant level.
 3. Impairment rates are coefficients adjusted by the transformation, $\text{antiln}(\text{coeff.}) - 1$.

Source: TCADA Adult Survey (Texas Commission on Alcohol and Drug Abuse).

AREA7, and AREA8) have the expected negative effects on income, relative to Dallas/Fort Worth Region.

Three disorder variables, ALCOABUSE, DRUGABUSE, and ALDRABUSE, are included in the indicator model. The effects of ALCOABUSE and ALDRABUSE are negative and very significant in the income regression. The DRUGABUSE coefficient is quite weak, though negative, for all labor force participants. The impairment rates due to alcohol and drug abuse are then obtained by conducting the antilog transformation (which is mentioned in the last section) on the estimation coefficients, as also shown in Table C.1. The impairment factors are (negative) 11.42 percent, 8.84 percent, and 14.35 percent for disorders ALCOABUSE, DRUGABUSE, and ALDRABUSE, respectively.

APPENDIX D - FORMULA FOR CALCULATING THE PRESENT VALUE OF LIFETIME EARNINGS

The formula for the present value of future lifetime earnings is presented below:

$$PV = \sum_{i=a}^{85} \frac{(X_i W_i P_a^i + H_i K_i P_a^i)}{(1+r)^{i-a}},$$

where

- PV : the present value,
- a : the midyear age for the given cohort of persons,
- r : the discount rate,
- X_i : the annual mean earnings for persons in the age group with the midpoint age i,
- W_i : the average labor force participation rate in the age group with the midpoint age i,
- P_aⁱ : the probability that an individual aged a survives to i,
- H_i : the annual mean imputed value of housekeeping services for persons in the age group with the midpoint age i,
- K_i : the average housekeeping participation rate in the age group with the midpoint age i.

The product of W_iP_aⁱ is determined as follows:

$$W_i P_a^i = \frac{\sum_{j=t}^s L_j W_j}{L_a},$$

where

- j : the specific single age under consideration,
- t : the beginning year of the age group,
- s : the ending year of the age group,
- L_j : the number of persons surviving to j out of a cohort of 100,000 live births (based on Life Tables, *Texas Vital Statistics 1989*),
- W_j : the labor force participation rate at single age j,
- L_a : the number of persons living at the midpoint age a for the given age group out of a cohort of 100,000 live births.

The product of K_iP_aⁱ is determined in the similar formation as W_iP_aⁱ.