

## Drug Use and HIV Infection: The Current Situation

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### INTRODUCTION

Reliable estimates of the nature and extent of the drug abuse problem in the United States are vital to the formulation of an effective national drug control policy. Some of the estimates important to policymaking are current rates of drug use and trends in use, specific populations and age groups at risk, and major health consequences associated with drug abuse. Data on trends in drug usage help provide useful information on the natural social course of drug epidemics and the effectiveness of Federal anti-drug efforts. Data collectors face certain barriers, however, including the illegal nature of drug use, which leads to questions of the reliability of self-reported drug use, and the difficulty reaching certain populations with standard survey techniques, including homeless people and people not in school.

The connection between intravenous (IV) drug use and human immunodeficiency virus (HIV) infection has added urgency to the need to combat drug abuse. IV drug abuse has been described as the “engine of the current HIV epidemic,” because equipment-sharing and certain sexual practices of IV drug users constitute high-risk behavior for HIV transmission (145). The acquired immunodeficiency syndrome (AIDS) epidemic, which runs about 5 to 10 years behind the HIV epidemic, has also shown a growing proportion of IV drug users among new cases. IV drug users now account for one-third of all AIDS cases and are the second highest risk category for AIDS, exceeded only by homosexual and bisexual males (349). Non-IV drug use has also been connected to the spread of HIV infection through sexual transmission. Cocaine use, especially in the form of crack, has been linked to increased sexual activity, multiple partners, and an increased likelihood of spreading the virus to drug-using and nondrug-using sexual partners. Understanding the links between drug abuse and HIV infection and the magnitude of the problem is a necessary first step in determining the best strategy for reducing the spread of HIV among drug users.

This chapter describes of the use of illegal drugs in the United States, with a focus on heroin and cocaine because of their frequent IV administration and connection with HIV transmission. A discussion of measurement issues associated with drug abuse and an overview of rates and trends in use are also provided. The chapter then addresses the critical link between drug use and HIV infection, including a discussion of the routes of HIV transmission; estimates of the number of IV drug abusers, risk behaviors, and prevalence of HIV-infected drug abusers; and a review of AIDS cases reported to the Centers for Disease Control. The chapter concludes with a brief discussion of the cost of drug abuse to society.

### USE OF ILLEGAL DRUGS IN THE UNITED STATES

#### *Substance Dependence, Substance Abuse, and Casual Use*

Substance dependence, substance abuse, and casual use are three categories that are often used to classify the use of illegal drugs. Patterns of psychoactive substances use actually fall along a continuum, ranging from experimental, occasional, and recreational use to abuse and dependence. Defining these terms and developing treatments have been particularly difficult because the causes and consequences of drug use vary so extensively with the substance used, the user, the dose, the route of administration, and the social circumstances of initial and sustained use (133).

The concept of addiction has undergone many revisions, from theories of personal responsibility in the early 1900s to an appreciation of environmental and societal influences in the aftermath of the Depression and World War II and a theoretical preference for physiological explanations of addiction during the 1970s and early 1980s (including genetic and chemical predispositions) (266). With the increasing problem of cocaine abuse, the concept of addiction has more recently evolved to a concept of

the 'dependence syndrome.' As Shaffer and Jones note, the World Health Organization's emphasis on a syndrome of dependence "recognizes the inefficiency and futility associated with trying to determine the distinction between psychological and physiological dependence" (266). The dependence syndrome concept incorporates quantitatively defined patterns of behavior, neuroadaptation (as evidenced by tolerance or withdrawal syndrome), and psychological drug craving or dependence (266). Although the American Psychiatric Association's first two diagnostic manuals classified drug dependence and alcoholism as personality disorders, it has now "become clear that there is no single type of addictive or dependence-prone personality, no personality traits that reliably indicate in advance who is likely to use or misuse drugs" (134).

In its latest Diagnostic and Statistical Manual for Mental Disorders (Third Edition Revised) (DSM-III-R), the American Psychiatric Association defined psychoactive (mind-altering) substance dependence as "a cluster of cognitive, behavioral, and physiologic symptoms that indicate that the person has impaired control of psychoactive substance use and continues use of the substance despite adverse consequences" (6). According to the American Psychiatric Association's substance dependence criteria, at least three of the nine characteristic symptoms of dependence must be present for diagnosis (box 2-A). Some of these symptoms include failed attempts at controlling excessive drug use, substantial time spent procuring the substance (including theft, taking the drug, and time recovering), and a variety of social, psychological, and physical problems. Symptoms of the

*Box 2-A--American Psychiatric Association > Diagnostic Criteria  
for Psychoactive Substance Dependence*

At least three of the nine characteristic symptoms of dependence (below) are necessary to make the diagnosis of substance dependence (6). In addition, some symptoms of the disturbance must have persisted for at least 1 month or have occurred repeatedly over a longer period of time.

Symptoms of dependence:

1. substance often taken in larger amounts or over a longer period of time than the person intended;
2. persistent desire or one or more unsuccessful efforts to cut down or control substance use;
3. a great deal of time spent in activities necessary to get the substance (e.g., theft), taking the substance (e.g., chain smoking), or recovering from its effects;
4. frequent intoxication or withdrawal symptoms when expected to fulfill major role obligation at work, school, or home (e.g., does not go to work because hung over, goes to school or work "high," intoxicated while taking care of his or her children), or when substance use is physically hazardous (e.g., drives when intoxicated);
5. important social, occupational, or recreational activities given up or reduced because of substance use;
6. continued substance use despite knowledge of having a persistent or recurrent social, psychological or physical problem that is caused or exacerbated by the use of the substance (e.g., keeps using heroin despite family arguments about it, cocaine-induced depression, or having an ulcer made worse by drinking);
7. marked tolerance: need for markedly increased amounts of the substance (i.e., at least a 50 percent increase) in order to achieve intoxication or desired effect, or markedly diminished effect with continued use of the same amount;
8. characteristic withdrawal symptoms (see specific withdrawal syndromes under Psychoactive Substance-induced Organic Mental Disorders);
9. substance often taken to relieve or avoid withdrawal symptoms.

dependence syndrome include, but are not limited to, the physiologic symptoms of tolerance and withdrawal. Symptoms of tolerance occur when the same amount of a particular drug produces less effect. This often leads the individual to take increasingly larger or more frequent doses of the drug in order to obtain the effect of the original dose. Withdrawal symptoms can result either when users come down from an acute intoxication or when regular users of heavy doses stop taking the drug entirely (abstinence syndrome).

Psychoactive substance abuse is a subset of drug dependence. Substance abuse is characterized by maladaptive patterns of behavior that have not met the American Psychiatric Association's criteria for dependence. Indicators of maladaptive patterns associated with substance abuse include evidence of continued use despite knowledge of persistent or recurrent social, occupational, psychological, or physical problems caused or exacerbated by drug use, or recurrent use in situations in which use is physically hazardous (e.g., driving while intoxicated) (6). Some symptoms must have persisted for at least 1 month or have occurred repeatedly over a long period to support a diagnosis of substance abuse.

Finally, casual or recreational use includes users who take certain drugs only occasionally or in low to moderate doses and can usually stop without formal intervention (e.g., treatment) when the dangers begin to outweigh the advantages. Casual users do not exhibit the seriously maladaptive patterns of drug consumption and resultant behaviors associated with substance dependence or substance abuse. They may be at risk, however, for health problems and later developing substance dependence (238).

Dependence has also been defined by the 3-Cs: continued use in the face of adverse physical or psychic reactions; compulsion to use drugs; and feeling of being out of control regarding drug use (266). Other researchers stress the inability to

remain abstinent as a primary indicator of dependence (226). Studies have shown that heavy use of certain drugs (including opiates, amphetamines, and cocaine) is more likely to lead to dependence than others (133). In addition to individual biological differences, the route of administration of the drug is also an important variable in determining whether drug use will result in dependence. "In general, routes of administration that produce more rapid and efficient absorption of the substance into the bloodstream tend to increase the likelihood of an escalating pattern of substance use that leads to dependence" (6). For this reason, a person is much more likely to develop dependence on heroin or cocaine if they are smoked or taken intravenously than when they are sniffed or taken orally (see ch. 4). Once drug dependence develops, it often persists as a chronic condition, with relapse being the rule (13). Although the term addiction is often used interchangeably with dependence, addictive behaviors can be identified by the high frequency of their occurrence, not by the presence of physical dependence (266).

### *Drugs of Abuse*

Accurate assessment and appropriate treatment of drug-using clients requires a working knowledge of the commonly used psychoactive drugs and their effects. Although almost all the currently used recreational drugs have been extensively investigated, drugs are continuously being used in new ways and in combination with different drugs. Understanding the distinctions among the various drug categories and being able to identify signs of intoxication, withdrawal, and overdose are essential, both for treatment and for data collection.

For medical and psychiatric purposes, commonly used drugs are often grouped into the following six categories, reflecting the primary action of each:

1. narcotics (opiates, including heroin) and related analgesics ;
2. stimulants (including cocaine, amphetamines, nicotine, and caffeine);
3. sedative-hypnotics (including alcohol, barbiturates, non-barbiturate sedatives, and minor tranquilizers);
4. hallucinogens (including lysergic acid diethylamide (LSD));
5. phencyclidine (PCP); and
6. cannabis (marijuana) and inhalants.

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<sup>1</sup> Although the degree of tolerance varies with the drug used and other circumstances, almost all drugs eventually produce tolerance for two reasons: 1) the liver produces more of the enzymes that break a drug down (metabolic tolerance), and 2) the brain becomes adapted to the new chemical environment created by the drug and no longer responds to it so intensely (central nervous system tolerance)(133).

Other classifications of drugs may vary from this one, depending on how broadly or narrowly the groups are defined. Distinguishing among drugs based on their effects may also be complicated by the fact that the intoxication effects of one drug (e.g., hallucinogen intoxication) may be quite similar to the withdrawal symptoms associated with another type of drug (e.g., the disorientation and hallucinosis associated with sedative-hypnotic withdrawal) (6). Diagnosis is further complicated by the use of multiple substances (polydrug abuse), often with a second drug being used to enhance the “high” or to counteract the lingering unpleasant effects caused by the first drug.

One common feature of all abused drugs is that they function as behavioral reinforcers. As the effects of the drug strengthen the behavior that leads to their administration, deeply-ingrained behavior may result over time (238). This view helps explain how experimenting with abused drugs can lead to drug dependence. In general, the effects of drug use can be either acute (resulting from a single dose or a series of short or episodic doses) or chronic (resulting from long-term use) and can affect physical, psychological, and social health (133).

Because it is primarily the route of drug administration that links drug use to HIV transmission and not the drug itself, the following discussion will focus on narcotics and stimulants because drugs in these categories (e.g., heroin, cocaine, and amphetamines) are associated with IV drug use and the spread of HIV infection. Sexual transmission of HIV has also been associated with the effects of the stimulant crack cocaine, which often lead users to engage in increased sexual activity and to have multiple sexual partners (193). A brief description of the patterns of use, effects of the drug, symptoms of use and withdrawal, and health consequences of narcotics and stimulants follows. (App. E describes comparable information related to the other drug categories.)

#### Narcotics (Opiates) and Related Analgesics

Narcotics, also called opiates, are a class of drugs used medically to relieve pain, but also have a high potential for abuse. Heroin accounts for the majority of the opiate abuse in the United States. The preference for injection as the primary route of

heroin administration can lead to serious health consequences, most notably increased exposure to HIV through needle-sharing among IV drug users and other infections resulting from the use of contaminated apparatus (e.g., hepatitis, bacterial endocarditis, meningitis, and tetanus). Heroin is commonly sold in an adulterated form, “cut” with volume-expanding substances, such as quinine, that are known to cause toxic and allergic effects in some users. Another practice with dangerous consequences is the use of narcotics with other drugs, such as alcohol and cocaine.

Narcotics produce euphoria in users by activating the region of the brain responsible for producing pleasurable sensations (317). Several opiate receptors and endogenous neurotransmitters have been connected with opiate abuse and dependence and the development of tolerance to opiates (178). Within 2 to 5 minutes of IV opiate use, the user typically experiences euphoria that may last 10 to 30 minutes, followed by a longer period (2 to 6 hours) of lethargy, somnolence, and apathy (6). Constricted pupils, drowsiness, slurred speech, and impairment in memory and attention are also common symptoms of narcotic use. It is not uncommon for users to go “on the nod,” going back and forth between feeling alert to drowsy. Regular use of narcotics can lead to high levels of tolerance.

The need for readjustment after drug withdrawal usually produces symptoms roughly opposite to the drug effect (133). With narcotics withdrawal, abusers generally become anxious and restless and experience symptoms of watery eyes, runny nose, loss of appetite, diarrhea, abdominal cramps, chills, sweating, and nausea. Although most users initially take heroin because it produces euphoria, subsequent use is often driven by the desire to avoid the painful consequences of narcotics withdrawal. As with all the drug categories, the health consequences of narcotic use depend on the specific drug used, the dosage level, and the mode of administration. In addition to the risk of HIV and other infections mentioned earlier, narcotics users may develop skin abscesses and congested lungs. Although uncomfortable, in the absence of complicating medical conditions, physical withdrawal from narcotics is usually not life threatening.

Opiate-dependent pregnant women are often debilitated and tend not to obtain perinatal care and to have inadequate nutrition. As a consequence they suffer more often from anemia, heart disease, diabetes, pneumonia, and hepatitis than nonusers, and they have more spontaneous abortions, breech deliveries, caesarean sections, premature births, and stillbirths (312). Unless the mother has been withdrawn from opiates, the infant is likely to experience withdrawal symptoms (neonatal abstinence syndrome) and to be below normal birthweight.

### Central Nervous System Stimulants

Stimulants, often called “uppers,” refer to drugs that tend to increase alertness and physical activity. Cocaine and amphetamines are the two most common of the central nervous system stimulants. Three neurotransmitters have been implicated in the psychoactivity and withdrawal from stimulants; dopamine, norepinephrine, and serotonin (178). Severely dysfunctional stimulant use occurs in episodic, prolonged binges that disrupt sleep rather than in the regular daily use patterns seen with opiate dependence (116). Ingestion of high doses of these drugs in nontolerant persons can produce effects ranging from enjoyable subjective states of euphoria to acute psychotic states, seizures, cardiovascular collapse, and death (166).

Cocaine stimulates certain neurons in the central nervous system and causes the user to experience a sense of pleasure. When taken intravenously, cocaine produces a characteristic “rush” of well-being, confidence, and in some cases, euphoria (6). The physical effects of cocaine use include dilated pupils and increases in blood pressure, heart rate, breathing rate, and body temperature (312). Cocaine overdose deaths are often the result of multiple seizures followed by respiratory and cardiac arrest.

Unlike heroin, cocaine has not been associated with a clear-cut withdrawal syndrome, but it is not uncommon for stimulant users to experience a marked period of depression, often referred to as “crashing,” following a period of binging or cessation of drug use. Gawin and Kleber have identified a regular sequence of symptoms that occur in both the

immediate and prolonged period after cessation of cocaine use and have classified the symptoms into three phases: the crash, withdrawal, and extinction phases (116). The crash phase, lasting from only a few hours to 4 days, is characterized by agitation, depression, anorexia, and high cocaine craving during the early stages, followed by fatigue, depression, insomnia, and no cocaine craving in the later stages. During the withdrawal stage, lasting from 1 to 10 weeks, sleep normalizes, but the potential for relapse increases as anxiety and cocaine craving increase. The final phase, extinction, lasts between 3 and 12 months, and relapse to cocaine use becomes more closely tied to environmental cues that stimulate cocaine craving (116).

Cocaine and its derivative “crack” have become a focal point of the U.S. drug problem in recent years. Crack is the street name for freebase cocaine that has been processed from cocaine hydrochloride to a base, using ammonia or baking soda and water and heating it to remove the water (316). Cocaine hydrochloride powder is sniffed or injected, while cocaine alkaloid (“freebase” or “crack”) is smoked. Although average street-level purity of cocaine more than doubled from 1981 through 1986, prices for the drug declined, according to the Drug Enforcement Administration, indicating increased availability (298). Recent trends, however, show a sharp rise in cocaine prices, which are approaching their highest level since mid-1985, and a decline in cocaine purity levels at all levels of the distribution chain (46).

Maternal cocaine use is associated with poor pregnancy outcome. Maternal use of cocaine and crack may adversely affect the fetus either through the pharmacological action of the drugs (e.g., high blood pressure, reduced uterine blood flows resulting in lower fetal oxygen levels) or because of the mother’s behavior while taking the drug (e.g., poor appetite, less likely to seek prenatal care) (301). Several studies have shown cocaine use during pregnancy to increase the risk of both pre-term delivery and intrauterine growth retardation (53,1%,236,380). In a study of patterns of cocaine use in pregnancy, Chasnoff, et al., found that infants born to mothers who used cocaine (either during the first trimester only or throughout pregnancy) demonstrated significant impairment of orientation, motor skills, and

the ability to remain alert. Infants born to women who have used cocaine throughout pregnancy were also more likely to have low birthweights, decrements in length, and smaller head circumferences (53,236,380).

Like cocaine, amphetamines may produce feelings of euphoria and heightened energy. The physical effects of amphetamines include decreased appetite<sup>2</sup> and increased heart and breathing rates and blood pressure, and users usually report feeling restless, anxious, and moody. Both cocaine and amphetamines, when used in large doses over a long period of time, can lead to hallucinations and paranoia. When people stop using amphetamines, they may sleep for long periods and feel hungry, irritable, and depressed. Like narcotics, amphetamine use can slowly lead to high tolerance. Amphetamines are usually sold in tablet or capsule form, but users may also sniff the crystals or inject them.

### *Magnitude of the Drug Abuse Problem*

#### **Measurement Issues**

Statistics on the drug problem are particularly difficult to compile and interpret (289,293). The primary measurement problem stems from poor self reporting, a consequence of the illegal nature of drug use. Finding survey respondents who are willing to participate and answer questions honestly, which in some instances requires admitting to illegal behavior, is a definite stumbling block. Two of the major methodological issues in the collection of data are validity (whether a variable measures what it purports to measure) and reliability (the consistency of measurement) (251). Reassuring respondents of the confidentiality and anonymity of their responses has been one means of increasing response rates and the validity of the data. Using drug testing to validate self reports is another. Significant progress has also been made in the past 2 decades in utilizing standard definitions and methodologies in drug surveys, thus making comparisons and integration of data more feasible (293).

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<sup>2</sup>Amphetamines are often first taken for their appetite-suppressant effect in an attempt to lose weight.

## **Major Surveys on Drug Abuse**

Information on the use of illegal drugs in the United States is based on a family of surveys that focus on drug use within a particular population (e.g., high school seniors) or at a particular setting (e.g., hospital emergency rooms). Some of the surveys overlap, and some populations, such as high school dropouts and homeless people, are difficult to reach and may go uncounted. Taken alone, none of the current studies provides a complete picture of drug abuse in the United States; however, when viewed together, these studies provide an overview of the drug problem and its evolution (289,293).

The two major national surveys of the prevalence of drug use are 1) the National Household Survey on Drug Abuse and 2) the High School Seniors/Monitoring the Future Survey (306,330). In addition, the Drug Abuse Warning Network (DAWN) provides useful data on drug-related hospital emergencies and deaths (328). Important features of each data source are highlighted below.

#### National household survey

- o **covers** the general household population **aged** 12 years and older living in the continental United States;
- o **conducted every** 2 to 3 years since 1971;
- o sample sizes ranging from 3,186 (1971) to 8,814 (1988), half white and half evenly split between blacks and Hispanics;
- o **face-to-face interviews** and self-administered written questionnaires;
- o **populations** excluded: the homeless, military personnel living on base, and those in dormitories, hospitals, treatment centers, and jails;
- o beginning with the 1985 survey, only one respondent was interviewed per household;
- o questions respondents about their past drug use, attitudes, and consequences of drug use;
- o conducted by the National Institute on Drug Abuse (NIDA's) Division of Epidemiology and Prevention Research.

High school seniors survey

- o high school senior population (aged 17 to 18);
- o conducted every year since 1975;
- o Sample Size about 16,000 (130 to 140 public/private schools);
- o self-administered questionnaire completed during class time;
- o populations excluded include dropouts and absentees;
- o through a longitudinal study of a subsample of each class, maturation factors associated with drug abuse are monitored (about 2,400 participants of each graduating class are chosen for followup study, half of the sample being surveyed continually on even-numbered years and half being surveyed on odd-numbered years);
- o research is performed by the University of Michigan's Institute of Social Research and is funded largely by NIDA.

Drug Abuse Warning Network (DAWN)

- o reports the consequences of drug abuse as reflected by emergency room (ER) episodes for drug-related problems and medical examiner reports of drug-related fatalities;
- o ongoing since 1972;
- o nonrandom sample of about 600 ERs in 21 metropolitan areas and on national panel (statistical sample being implemented in ERs);
- o nonrandom sample of medical examiners in about 85 jurisdictions in 26 metropolitan areas;
- o records mention of drugs being ingested up to 3 days prior to hospital ER visit;
- o up to four different substances can be specified for each ER episode, and six substances can be reported for each death;
- o conducted by NIDA's Division of Epidemiology and Prevention Research.

It is generally believed that both the household survey and the high school senior survey provide *conservative* estimates of the general level of drug use. In fact, neither survey purports to measure the nation's total drug-abusing population. Tomas and Kozel identify two reasons that the true level of drug abuse may be greater than these surveys indicate. The first reason is that the drug-abusing population is difficult to reach, especially through traditional survey techniques (293). Young males are the least likely group to be found at home to take the household survey, yet they are the highest age-gender

drug-using group (293). The household survey also excludes residents of many places (prisons, jails, homeless shelters, and drug treatment centers) where one would expect to find greater prevalence of drug addicts (34). School dropouts who are missed by the high school seniors survey are also known to have higher drug use rates than nondropouts (293)? To the extent that this is true, the senior survey may underestimate the extent of drug abuse among this age group.

The second reason for possible underreporting with surveys on drug abuse relates to self-reporting methods. As mentioned earlier, certain respondents may be hesitant or unwilling to admit to illegal behavior or have trouble recalling specific times and drug use patterns (293,308). This would be particularly true of young respondents answering questions in the presence of a parent or teacher, even though answers to questions concerning illicit drug use are recorded on paper, not aloud.

It is also important to note that DAWN is not a representative sample, and therefore its data cannot be extrapolated to all the ER cases in the United States (293). Also, the number of ER episodes reported by DAWN should not be assumed to equal the number of individuals involved, since one person may make repeated visits to an ER (328). Incomplete reporting, despite specific procedures for identifying drug abuse episodes and reporting delays of up to 1 year for some medical examiners are two of DAWN's limitations. Also, there is no distinction made between licit and illicit drugs or drug use that is and is not believed to be related to the complaint. In other words, a stabbing victim will be reported if use of heroin, cocaine or legally dispensed methadone is reported, even if the stabbing had nothing to do with such use. To the extent that this occurs, it lessens the value of DAWN as a reflection of the true health consequences associated with drug use. Of particular relevance to this report is the fact that 1988 medical examiner reports exclude data on deaths involving AIDS.

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<sup>3</sup>According to the Digest of Education Statistics, 8 percent of the population aged 16 and 17 were not enrolled in school in October 1986, and in some urban sub-populations, up to 40 percent are not in school (305).

Box 2-B summarizes the purpose and administration of other major drug use information systems.

### **Data Gaps and Developments**

The Public Health Service report on improving drug abuse statistics highlighted the need for additional prevalence data on school-based populations and special subgroups and hidden populations, such

as heavy users and selected minority groups (308). Because “hidden” groups are difficult to reach through conventional survey methods, special approaches and targeted, smaller studies may be necessary (308). Because national estimates may mask the differences that occur among metropolitan areas, there is also a need for surveys of major metropolitan areas. The Public Health Service is currently involved in initiating several major data col-

#### *Box 2-B--Other Information Systems on Drug Use*

In addition to the household survey, the high school seniors survey, and DAWN, several other sources of information on drug use in the United States help give a more complete picture of the drug problem. Some of these include:

- o National Drug and Alcoholism Treatment Unit Survey (NDATUS). Periodical survey of all known alcohol and other drug units since 1973. Information is collected on services available, funding sources, utilization rates, and client characteristics (see ch. 3).
- o State Alcohol and Drug Abuse Profile (SADAP). Annual survey of State alcohol and drug abuse agencies conducted by the National Association of State Alcohol and Drug Abuse Directors since 1984. Collects information on funding and program and client characteristics for units that receive at least some funds administered by the State alcohol and drug agency (see ch. 3).
- o Drug Use Forecasting program. The National Institute of Justice monitors drug use among recently arrested persons in selected cities. Staff obtain voluntary, anonymous urine specimens and interviews from a sample of arrestees in booking facilities in 22 cities throughout the United States. For most drugs, including cocaine and heroin, the urine test can detect use in the prior 2 to 3 days.
- o Treatment Client Data System”. This data system is composed of the remnants of the former Client Oriented Data Acquisition Process (CODAP). From 1973 to 1981 all treatment programs receiving Federal funds were required to report client admission data to NIDA. Following the Omnibus Reconciliation Act of 1981, which deleted various State reporting requirements including CODAP, only six States continue to share data with NIDA on client information.
- o Community Epidemiology Work Group. Researchers from selected metropolitan areas of the United States meet semiannually with NIDA staff, experts from European countries, and representatives from other interested groups to assess the drug abuse picture in their respective areas. The Community Epidemiology Work Group provides for the transfer of epidemiologic information that can identify new drug abuse patterns and trends and groups most likely to be affected.
- o Military personnel survey. Office of the Assistant Secretary of Defense. Four waves between 1980 and 1988. Prevalence of drug use among military personnel worldwide.
- o Hispanic Health and Nutrition Examination Survey. National Center for Health Statistics. One-time household survey, 1982 to 84. Included survey supplement from the Alcohol, Drug Abuse, and Mental Health Administration on use of drugs by Hispanics.
- o National Maternal and Infant Health Survey. National Center for Health Statistics National probability survey of registered births in 1988 (live births, stillbirths, and infant deaths before 1 year of life). Information on the use of tobacco, marijuana, and cocaine during pregnancy.



lection efforts. One such effort is the development of the Metropolitan Area Survey, a large-scale comprehensive study of prevalence, incidence, and consequences of drug abuse in the Washington, DC metropolitan area. This survey will be unique in its attempt to assess drug abuse in some "hidden" populations, including persons who are homeless, transient, chronically mentally ill, high school dropouts, and criminal offenders. The In Utero Drug Exposure Survey is another new initiative that will acquire data on the prevalence of prenatal exposure to all major drug types, the temporal patterns of that exposure, and the demographic characteristics of the exposed infants and their mothers.

### **An Overview of Drug-Use Rates and Trends**

Any Illicit Drug--According to the 1988 household survey, 72 million Americans age 12 or older (37 percent of the population) have tried marijuana, cocaine, or other illicit drugs at least once in their lifetimes (330). Twenty-eight million (14 percent) had used some type of illicit drug at least once in the past year, and 14.5 million (7 percent) had used drugs within the 30 days prior to the administration of the survey (defined as current use). Demographic subgroups with elevated rates of current use include males (9 percent), those in large metropolitan areas (9 percent), those living in the West (10 percent), those employed part time (9 percent), and unemployed people (18 percent). Among the 20- to 40-year-old age group of full-time employed Americans, 12 percent were current users (10 percent used marijuana and 3 percent used cocaine, not mutually exclusive). Among the nearly 60 million women 15 to 44 years of age, the child-bearing years, over 5 million (9 percent) were current users, almost 1 million (2 percent) having used cocaine within the previous month.

Statistics on current use of illicit drugs continued a declining trend that began in the early 1980s and accelerated between 1985 and 1988 (306). Comparison of the 1988 household survey with the previous 1985 survey shows a major decrease in illicit

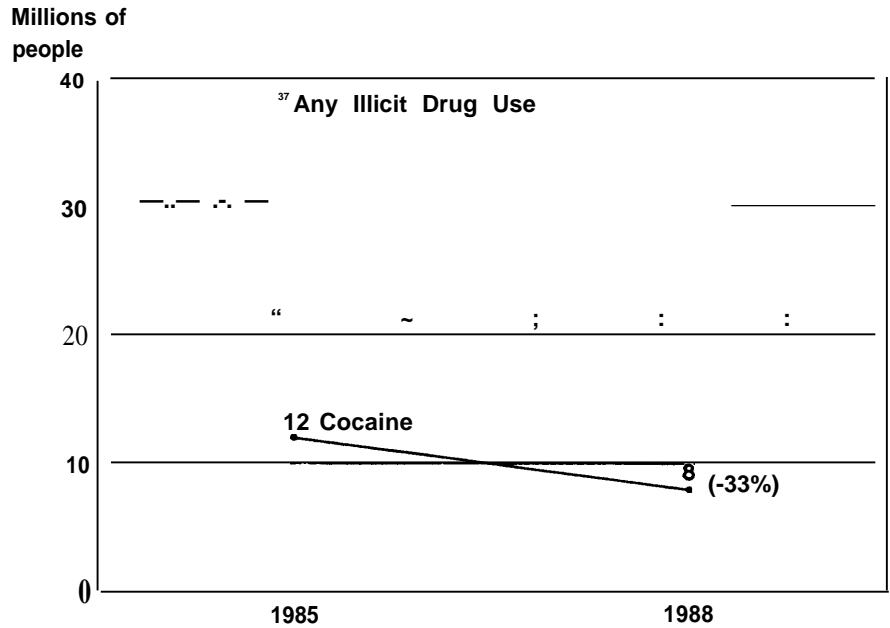
drug use noticeable in an almost 25-percent decrease in use of any illicit drug at least once in the past year (from 37 million to 28 million) and a 37-percent decrease in the use of any illicit drugs during the past month (from 23 million to 14.5 million) (see fig. 2-1 for trends in use of illicit drugs during the past year). The decline in current drug use between 1985 and 1988 was seen in all segments of the population--among both men and women; for all race and ethnic groups; throughout all regions of the country; and for all levels of educational attainment.

Figure 2-2 illustrates the trends in lifetime, annual, and current illicit drug use from 1975 through 1989 for high school seniors, all of which peaked during the late 1970s and early 1980s and have been steadily decreasing since (306). Between 1988 and 1989, annual use of illicit drugs among high school seniors decreased from 38.5 percent to 35.4 percent, and current use decreased from 21.3 percent to 19.7 percent.

Heroin--About 2 million household members (1.0 percent of the population aged 12 and older) have tried heroin in their lifetimes (330). Trends in the prevalence of lifetime use between 1985 and 1988 showed a decreasing trend among males and people in the 18 to 25 and 26 to 34 age groups, but increases for those in the 12 to 17 and > 35 age groups, among blacks, and to a lesser extent, among Hispanics and among people living in the Northeast region (see figs. 2-3 and 2-4). The increase in heroin use during one's lifetime for 12 to 17 year olds reflects increasing use among young people, while increasing trends for people age 35 or older mean that use rates in their youth were high. Decreasing trends for 18- to 34-year olds mean use rates in youths were smaller a decade or 2 ago than they were before. According to the 1989 high school seniors survey, 1.3 percent of seniors had tried heroin at least once (306).

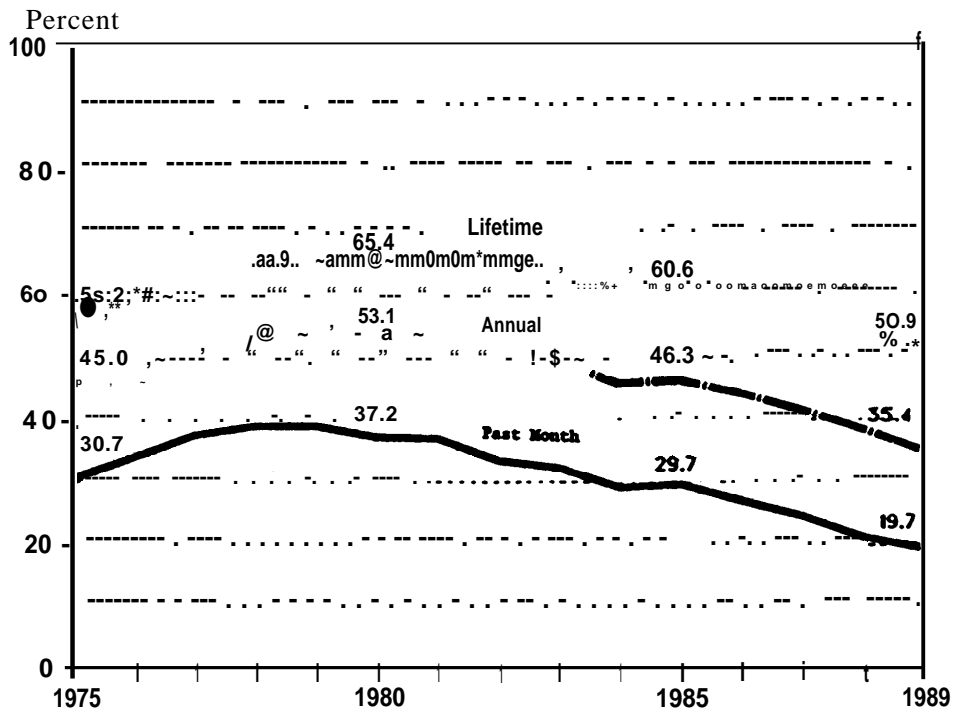
Although cocaine mentions increased dramatically as a percentage of the total ER mentions between 1984 and 1988, heroin mentions continue to account for about 13 percent of all ER mentions (see

Figure 2-1--Use of Any Illicit Drug During the **Past Year**, National Household Survey, 1985 and 1988



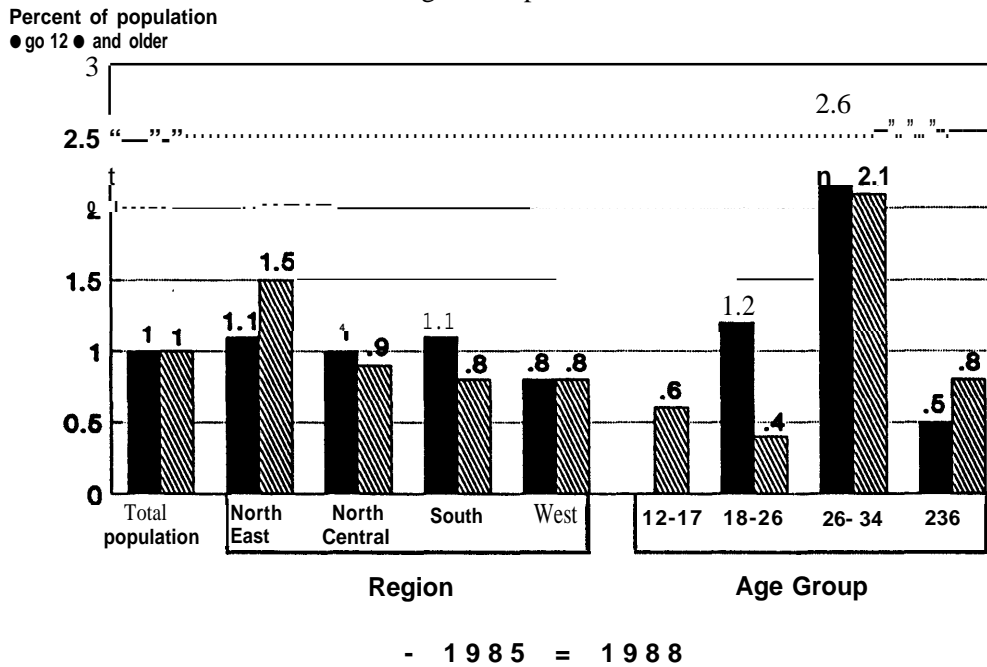
SOURCE: U.S. DHHS, NIDA (330,331).

Figure 2-2--Any Illicit Drug Use by High School Seniors, 1975 to 1989



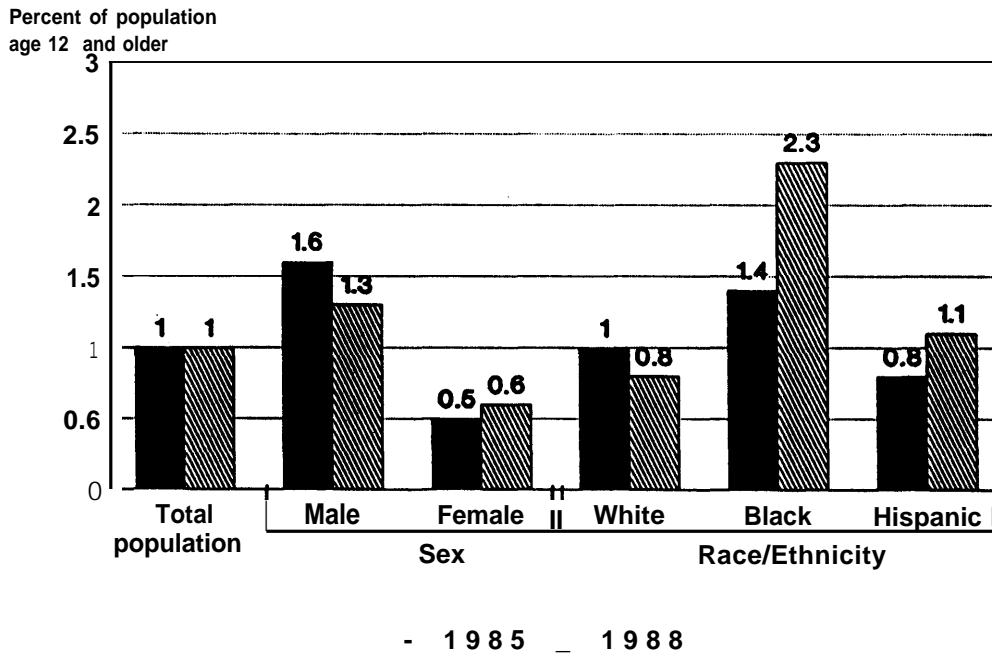
SOURCE: U.S. DHHS (306).

Figure 2-3--Percent of Population Reporting Heroin Use in Lifetime by Region and Age Group, 1985 and 1988



SOURCE: U.S. DHHS, NIDA (330,331).

Figure 2-4--Percent of Population Reporting Heroin Use in Lifetime by Sex and Race/Ethnicity, 1985 and 1988



SOURCE: U.S. DHHS NIDA (330,331).

fig. 2-5). The total number of heroin mentions increased 133 percent between 1984 and 1988, with 58 percent of that increase coming between 1987 and 1988 (see fig. 2-6).

In 9 of the 14 cities included in a Drug Use Forecasting study in the first quarter of 1989, less than 10 percent of male arrestees had positive urine tests for opiates (see box 2-B for a description of this study) (336). Of those who tested positive for opiates, 81 percent also tested positive for cocaine.

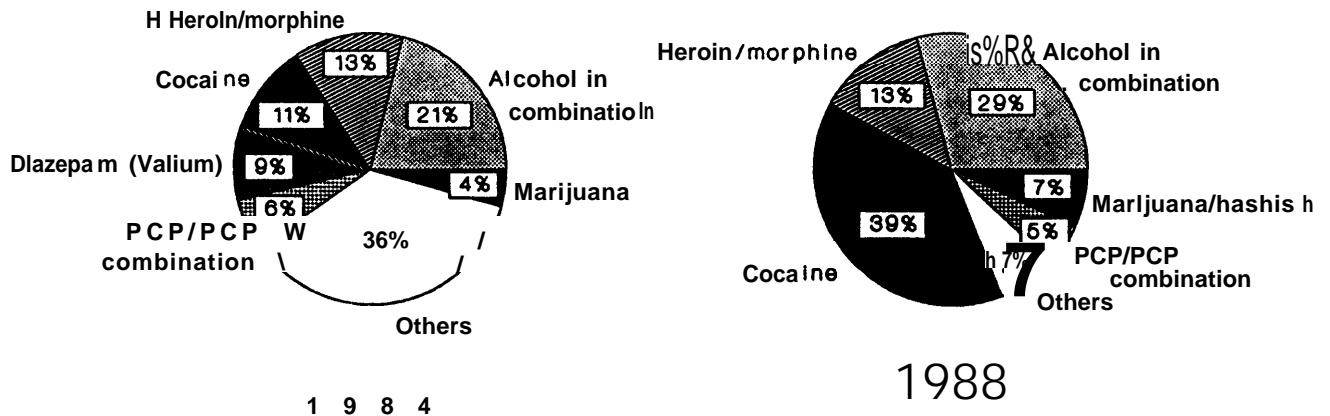
Cocaine--An estimated 21.2 million people (11 percent of the household population aged 12 or older) have tried cocaine during their lifetimes, while 8.2 million (4.1 percent) have used cocaine at least once during the past year, and 2.9 million (1.5 percent) have used the drug at least once during the past month (330).

The number of household members who used cocaine within the past year dropped 33 percent between 1985 and 1988 (from 12.2 million to 8.2 million). The percent of household members

reporting cocaine use during the past month decreased by about 50 percent between 1985 and 1988 for both males and females, with males still twice as likely to be current users as females (see fig. 2-7). Another noticeable trend between the 1985 and 1988 household survey was the increased prevalence of cocaine use among Hispanics. Although lifetime prevalence of cocaine use remained stable for whites and blacks, there was an increase among Hispanics between 1985 and 1988 (from 7 percent to 11 percent). The Hispanic population was also the only race/ethnic group that did not experience a decrease in current cocaine use during this period (see fig. 2-7).

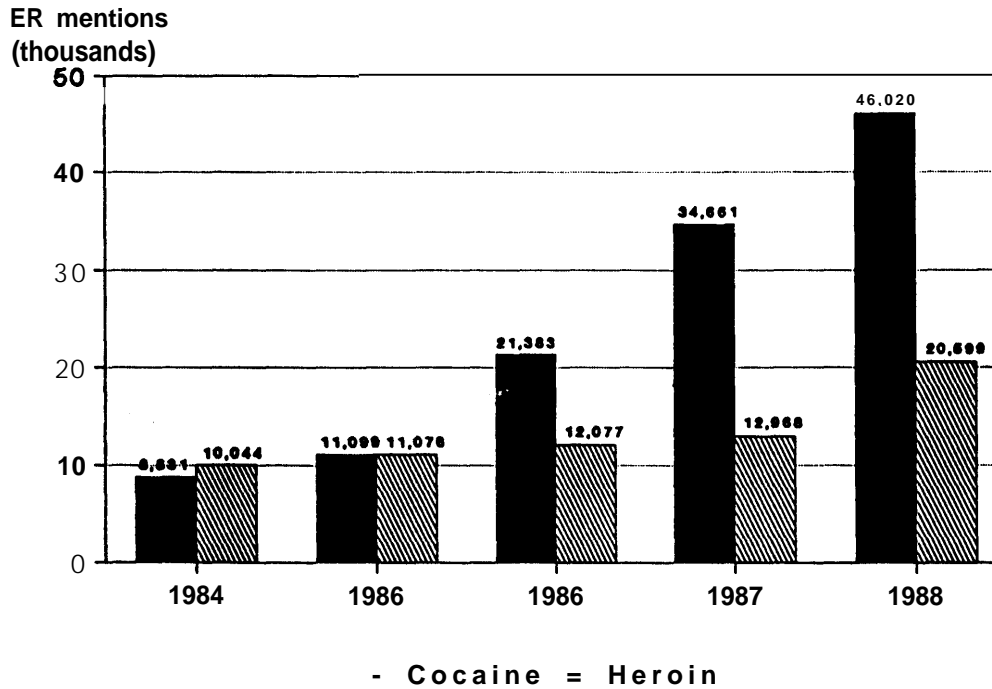
Despite the declining trend in the number of cocaine users, an increasing percentage used cocaine “more frequently. Among the 8.2 million people who used the drug within the past year, in 1988 862,000 people (11 percent) used the drug once a week or more (compared with 5 percent in 1985), and 4 percent used the drug daily or almost daily (compared with 2 percent in 1985) (see fig. 2-8) (330, 331).

Figure 2-5--Drugs Mentioned Most Frequently in Emergency Rooms Episodes, by Percent of Total Episodes



SOURCE: U.S. DHHS, NIDA (329).

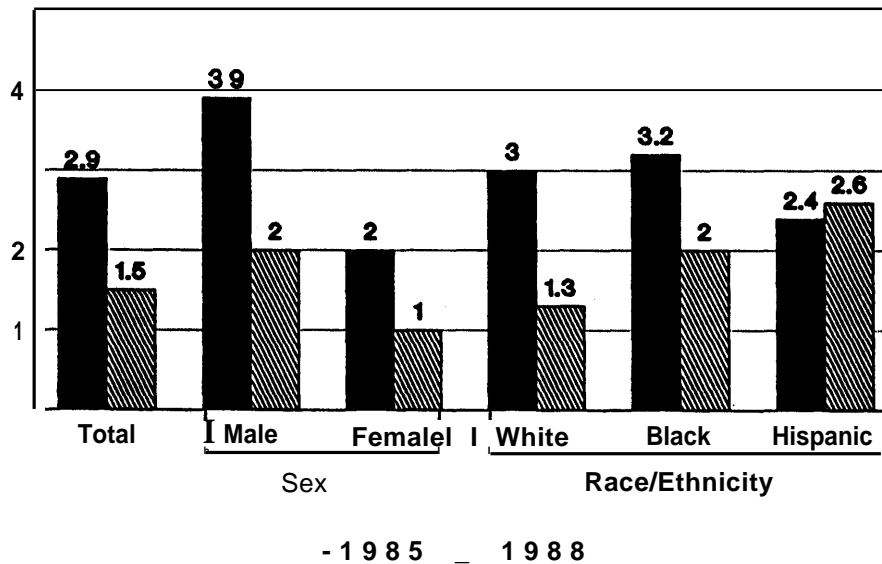
Figure 2-6-Trends in **Cocaine** and Heroin Emergency Room (**ER**) Mentions 1984 to 1988



SOURCE: U.S. DHHS, NIDA (329).

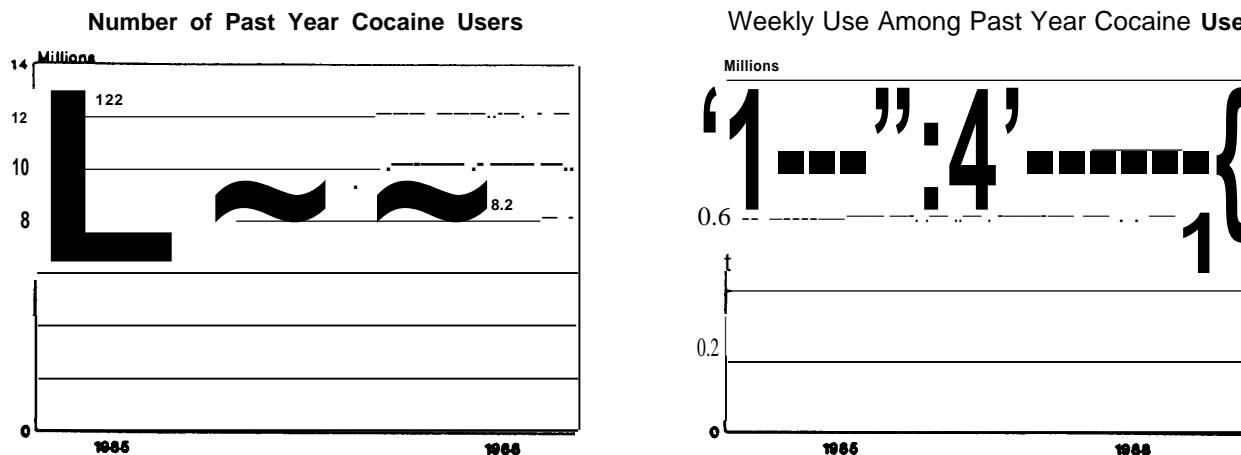
Figure 2-7--Percent of Population Reporting Cocaine Use in the Past Month by Sex and Race/Ethnicity, 1985 and 1988

Percent of population  
age 12 and older



SOURCE: U.S. DHHS, NIDA (330,331).

Figure 2-8--Cocaine Users During Past Year, 1985 and 1988



SOURCE: U.S. DHHS, NIDA (330,331).

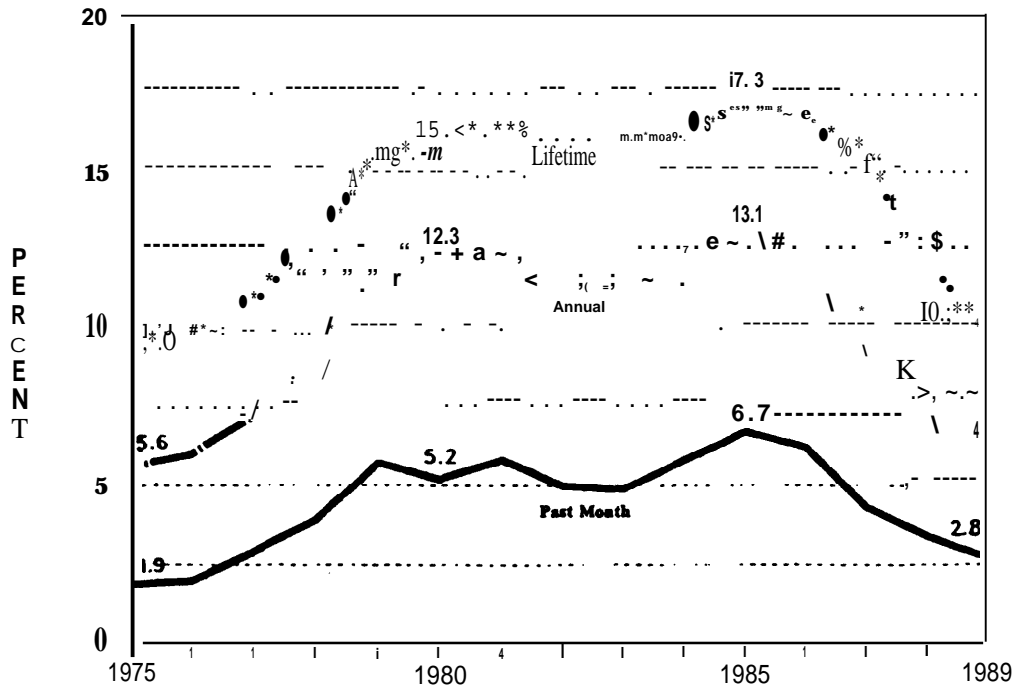
One noted limitation of the household survey is that it does not measure those who are arrested, homeless, or in treatment--places where one would expect to find disproportionate numbers of cocaine addicts (303). A recent staff report by the Senate Judiciary Committee, which attempted to take these "hidden" populations into account, put the total number of heavy cocaine addicts at 2.2 million about 2.5 times the number estimated by the 1988 household survey (303). Based on the estimate of 2.2 million heavy cocaine addicts, 1 out of every 100 Americans is a weekly user of cocaine (303). The Committee's estimate was based on four main sources of data including the nation's drug treatment centers, the homeless population, the criminal justice system, and NIDA's household survey. Most of the difference between the Committee's estimate and the household survey estimate comes from including an estimate of cocaine-using arrestees generated from the Drug Use Forecasting system of the National Institute of Justice (172). Although the Committee's estimate correctly emphasizes the need for better estimates of hard-to-reach populations, their means of deriving this estimate have been questioned and should be regarded with caution (146).

Figure 2-9 shows the trends in cocaine use among high school seniors between 1975 and 1989, illustrating the marked decline in cocaine use (lifetime, annual, and current use) since the peak in 1985. The percentage of high school seniors who have used cocaine at least once in their lifetimes dropped from 12.1 percent in 1988 to 10.3 percent in 1989 (306). Current use of cocaine also decreased from 3.4 percent in 1988 to 2.8 percent in 1989.

Even among young adults, the age group with the largest number of drug users, cocaine use was reported to decline over the past year. In the followup study of high school seniors who are now age 19 to 28, current cocaine use declined from 5.7 percent in 1988 to 3.8 percent in 1989, and use in the last year declined from 13.8 percent in 1988 to 10.8 percent in 1989 (306).

Although the declines in cocaine use over the past few years are encouraging, a note of caution in interpreting the survey results is warranted. The unreliability of self-reported declines in drug use, one of the methodological problems associated with underreporting, could exaggerate actual declines in

Figure 2-9--Cocaine Use by High School Seniors, 1975 to 1989

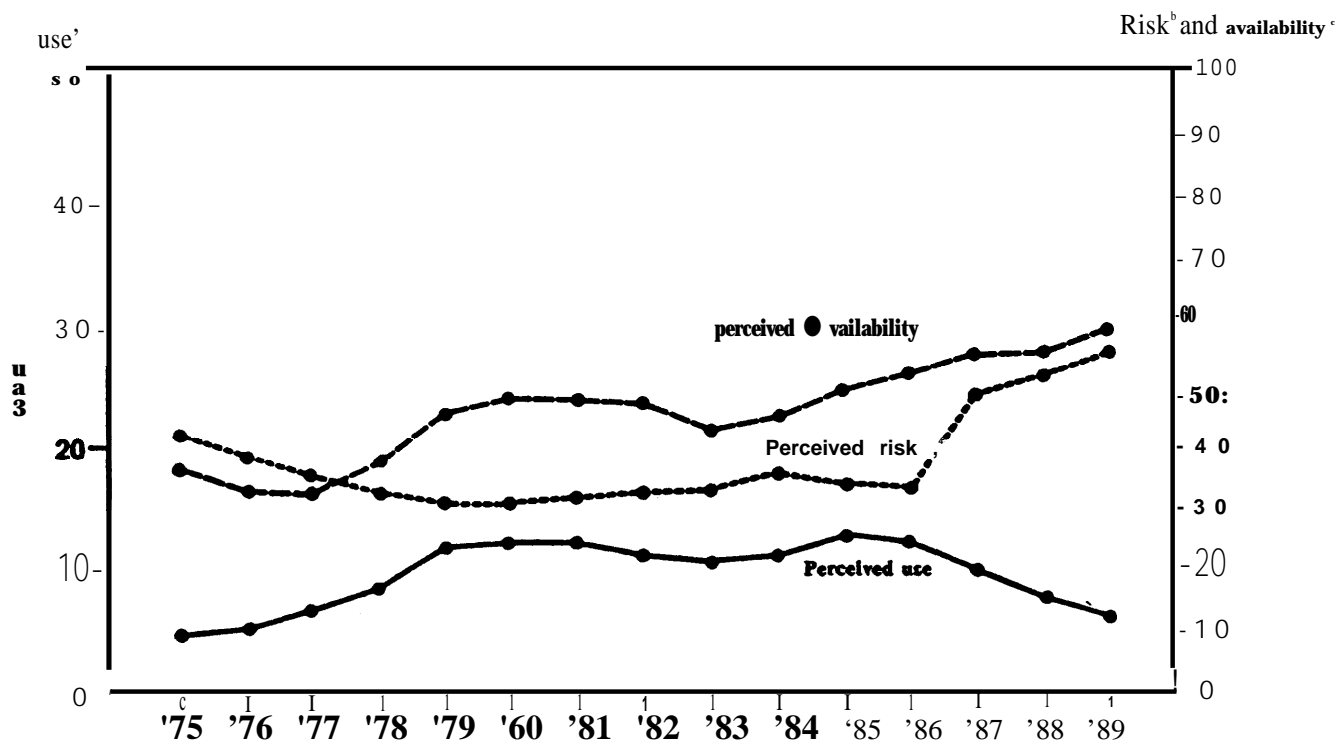


SOURCE: U.S. DHHS (306).

drug use. There may be reason to believe that self-reports are less reliable today than they were prior to 1986, given a dramatic change in the social climate toward illegal drug use. Kleiman notes that the size of the underestimate is probably growing and will continue to grow in conjunction with decreasing social tolerance for drug use and the continuing decline in the average social status of heavy cocaine users (172). As figure 2-10 illustrates, the perceived risk of cocaine use among high school seniors has increased dramatically since 1986, a trend that coincides with the cocaine-induced death of college basketball star Len Bias in the summer of 1986. The reported use of cocaine during the past year among seniors declined as the perceived risk of using cocaine once or twice increased (fig. 2-10). Although it is likely that the prevalence of cocaine use has declined as the major surveys show, it is also possible that a greater portion of those surveyed today are unlikely to report illegal drug use given the current social attitude.

Statistics reported by DAWN show that the drugs most frequently mentioned in ER episodes have changed dramatically in recent years (see fig. 2-5). Cocaine went from third with 11 percent of ER mentions in 1984 to first with 39 percent of ER mentions in 1988 (329). In 1985, cocaine surpassed heroin/morphine as the drug appearing most often in ER episodes (see fig. 2-6). The number of people admitted to hospital ERs following cocaine use, as reported by DAWN, increased more than fourfold over the 5-year period from 1984 to 1988 (from 8,831 cocaine mentions to 46,020 mentions) (table 2-1). Between 1987 and 1988, the total number of ER cocaine mentions increased 33 percent (from 34,661 to 46,020). The five metropolitan cities with the largest number of ER mentions of cocaine in 1988 include: New York (6,540), Washington, DC (5,221), Detroit (4,422), Philadelphia (4,156), and Chicago (3,907) (table 2-1). The trends in cocaine mentions varied by city. In New York and Los Angeles the two metropolitan cities with the highest number of

Figure 2-10--Cocaine Trends in Past Year Among High School Seniors, 1975 to 1989



<sup>a</sup>percent using once or more in past 12 months.  
<sup>b</sup>Percent saying great risk of harm in using once or twice.  
<sup>c</sup>Percent saying fairly easy or very easy to get.

SOURCE: U.S. DHHS (306).

cocaine mentions in 1984, the increase between 1984 and 1988 was relatively small. The cities with the greatest increase in cocaine mentions during this 5-year period include Dallas, Baltimore, Philadelphia, and Washington, DC (see table 2-1).

Cocaine was the most prevalent drug detected in male arrestees in the Drug Use Forecasting survey of 14 cities during the first quarter of 1989 (336). Urine tests positive for cocaine were most common in arrestees in New York (76 percent), Philadelphia (74 percent), and the District of Columbia (65 percent), and least likely in the smaller cities of Indianapolis (26 percent) and San Antonio (24 percent) (336).

Crack--According to the 1988 household survey, approximately 2.5 million (1.3 percent of the population aged 12 and over) have used crack at some time in their lives, 1 million (0.5 percent) in the past year, and 480 thousand (0.2 percent) during the past month (330). Data from the 1989 high school seniors survey report that 4.7 percent of seniors have used crack at least once in their lifetimes, and 1.4 percent have used the drug during the past month. The 1989 senior survey showed little change in lifetime, annual, and current use of crack from the 1988 data.

The DAWN network reported a stark rise in crack-related episodes from 549 in 1984 to over



**Table 2-1--Trends in Hospital Emergency Room (ER) Mentions of Cocaine Reported to the Drug Abuse Warning Network (DAWN), by Metropolitan Area, 1984 to 1988**

Years	New York	Washington, DC	Detroit	Philadelphia	Chicago	New Orleans	Los Angeles	Baltimore	Dallas	Seattle	Total <sup>a</sup>
1984.....	2,643	522	600	399	521	477	1,006	148	n	238	8,831
1985.....	2,944	793	992	570	714	501	1,606	221	157	246	11,099
1986.....	4,315	1,350	2,596	1,306	1,635	442	2,339	498	480	434	20,383
1987.....	6,486	3,182	4,633	2,670	2,817	1,907	2,248	%2	985	839	34,661
1988.....	6,540	5,211	4,422	4,156	3,907	3,221	2,988	1,841	1,381	1,321	46,020
Percent change, 1984-88.....	+15	+9.0	+6.4	+9.4	+6.5	+5.8	+2.0	+11.4	+16.9	+4.6	+4.2

<sup>a</sup>Based on consistently-reporting ERs with at least 90 percent reporting in the first 12 months, the second 12 months, and the last 36 months. The metropolitan areas listed made up 76 percent of ER mentions made during the 1988 calendar year.

SOURCE U.S. DHHS, NIDA (329).

15,000 in 1988 (329). In 1988, crack mentions represented 32.5 percent of cocaine mentions.

Heroin and Cocaine (“Speedballing”) --Although there are few data on the prevalence and trends in the use of heroin and cocaine together, there is some indication of the trends in health consequences associated with this combination of drugs. DAWN ER episodes involving both cocaine and heroin increased almost 200 percent, from 2,646 mentions in 1984 to 7,748 mentions in 1988 (329).

## DRUG USE AND HIV INFECTION

### *Routes of Transmission That Link Drug Use to AIDS*

The association between drug use and HIV transmission is well established. Three modes of transmission link drug use and HIV infection. The transmission of HIV infection among IV drug users occurs primarily through the sharing of contaminated injection equipment. Sexual transmission of HIV from an infected IV drug abuser to his or her partner and from an infected mother to her baby are two other modes of HIV transmission connected with IV drug use. The multiplicity of transmission modes makes drug users and, especially, IV drug users critical groups in the spread of AIDS.

At the core of the problem lies the use of substances that can be administered intravenously. A distinction may be unwarranted between licit and illicit substances, because the intravenous use of

anabolic steroids is also a potential vehicle for HIV transmission among groups such as adolescents and athletes who otherwise might not be at high risk for HIV infection. It should be emphasized that any form of IV drug use that involves the sharing of injection equipment has the potential for HIV transmission. It appears that the individual or combined use of two powerful and highly addictive illicit substances, heroin and cocaine (either injectable or smokable as crack) pose the greatest risk of HIV infection. Both of these drugs place users at increased risk of the equipment-sharing and sexual behaviors responsible for HIV spread.

Drug use practices vary throughout the United States, at least partly because of regional and cultural differences (26). The sharing of injection equipment, however, is a common practice throughout the country, in both low and high HIV seroprevalence areas (28). Various studies reported sharing rates between 70 and 100 percent (8). Injection equipment that may transmit HIV infection includes not only needles and syringes, but also other elements of the drug injection process, such as cotton, water, or the “cooker” used to mix the drug (26,174). Any contaminated blood remaining in the equipment can transmit the virus from one user to another. Both practical and economic reasons (limited availability of necessary tools) and social reasons (feeling of camaraderie and trust) are contributing factors to this well-established behavior in the drug abusers’ subculture (26,174). “Shooting galleries,” usually vacant buildings or alleyways, are common sites for such activities.

The other major avenue of HIV spread among IV drug users is through sexual transmission among IV drug users and to non-drug-using partners. It appears that a current epidemic of sexually transmitted diseases (STDs) facilitates further the spread of HIV (120,143). A recent report from two STD clinics in Baltimore showed that among heterosexuals who were not IV drug users, those who suffered from syphilis were seven to nine times more likely to have AIDS than other patients in the clinic (143). The increase in STDs is attributed to the increasing rates of cocaine use, both intravenously and in smokable form (crack) (260). Cocaine has been linked to increased sexual activity and multiple sexual partners (193). Furthermore, the exchange of sex for money or drugs is an additional force spreading HIV and other STDs (120,143).

The risk of contracting HIV infection from drug use relates to the user's needle-use behaviors and sexual practices. In both cases, the risk depends on the prevalence and infectiousness of HIV infection among the drug users or sexual partners. The risks associated with needle use depend on the number of persons sharing equipment, the use of rented or borrowed needles, the frequency of injection, and the frequency and effectiveness of needle-cleaning practices. The risk of HIV transmission through one needle-stick inoculation, which is comparable to one IV drug use, is estimated at about 0.4 percent (108a,200a). By sharing needles and injecting multiple times each day, IV drug users may frequently be exposed to HIV. The risks associated with sexual activity depend on the type of sexual practice, the number of partners, and the frequency of preventive measures, such as condom use. Research has estimated that the risk for HIV transmission through male-female vaginal intercourse is about 0.2 percent for each sexual encounter (141,145a). Researchers have noted that once HIV becomes established in a local area among IV drug users, they quickly become the primary source of heterosexual and *in utero* transmission (89).

Differences in HIV seroprevalence by primary and other drugs used are mediated through these risk behaviors. For example, the pharmacological properties of cocaine (strong reinforcer, short duration of action) lead to more frequent use and

binges. These patterns in turn are associated with increased HIV risk behaviors (3,372). Data from 1,878 active IV users of cocaine not in treatment in Chicago found that cocaine injectors used shooting galleries and shared drug paraphernalia more frequently than non-cocaine injectors (372). Recent studies from New York City found that crack use and crack-related sexual behavior were associated with HIV infection (48,255)

A recent study examined differences between seropositive and seronegative clients in a 1988 cohort of 222 admissions to methadone clinics in New York City (222). The results support previous findings that HIV infection is strongly associated with needle-sharing behaviors and the use of heroin and cocaine together ("speedballing"). A similar analysis of 218 subjects admitted in 1987 revealed that IV cocaine users were significantly more likely to be HIV positive than those who smoke or snort cocaine (221).

A seroprevalence study of IV drug users admitted to methadone clinics in 8 cities between 1987 and 1988 revealed that 71.3 percent reported using "speedball" during the past 5 years (24). These users were more likely to be seropositive, more involved with drugs, and engaged in high-risk drug-using and sexual behavior.

The potential for rapid spread of HIV infection among IV drug users should be emphasized (94). Explosive increases of HIV infection among IV drug users in Bangkok have been reported, with increases in HIV prevalence from 1 percent in late 1987 to 44 percent in September 1988. Sharing of injection equipment was identified as the primary risk factor (237,353). The investigators of a recent study that examined trends in HIV infection and AIDS risk behaviors among IV drug users in selected U.S. cities stated that although New York City and Ashbury Park already have high HIV-positive rates, Baltimore, Chicago, and Trenton, "may be approaching a 'critical mass' of infection which could result in rapid escalation" (29).

Seroconversion rates among IV drug users range from 3 to 10 percent or more per year and vary among different groups and cities (145). Analysis of data from 616 seronegative IV drug users not

enrolled in treatment in Chicago showed a 23-percent probability of seroconversion 25 months after entry into the study. This rate is almost tenfold higher than the rate reported in a cohort of gay men in Chicago during a similar time period (371).

HIV transmission has declined in homosexual men because of behavior changes since 1984, in hemophilia men because of heat treatment of clotting factors, and in transfusion recipients because of screening of blood collected since March 1985 (73, 253,360). A major route of HIV transmission now appears to be through exchange or sharing of needles used for IV drugs. Rates of seroconversion among drug users have remained high in recent years, and at least in some cities have not abated (145,371). Through May 1990, about 31 percent of AIDS cases were directly or indirectly associated with IV drug use (349). Thus, sharing injection equipment directly or indirectly has been a major vehicle for HIV transmission in the United States (349).

### *Estimates of IV Drug Abuse*

Rates and trends in the use of needles as a route of drug administration are particularly important given the link to HIV spread. The accuracy of such estimates is not clear, because the estimates are based largely on guesses (282). The estimates depend on, among other variables, the definition of IV drug users and how seroprevalence rates are estimated.

According to estimates provided by State alcohol and drug abuse agencies to the National Association of State Alcohol and Drug Abuse Directors as a part of the 1988 State Alcohol and Drug Abuse Profile (SADAP),<sup>4</sup> the number of IV drug abusers across the country was reported to be greater than 1.3 million in 1988 (see ch. 3 for a description of SADAP and results) (45). The Research Triangle Institute, after reviewing existing studies and methods for the estimation of the number of IV drug users, suggested a total current estimate of approximately 1.8 million (64).

Results from the 1988 household survey show that approximately 2.5 million people aged 12 and older (1.3 percent of the population) have used needles as a method of drug administration sometime during their lifetimes (330). About 500,000 (0.3 percent of the population) used needles during the year prior to the survey, with needle use most prevalent among males, 18- to 34- year olds, and blacks. Approximately 1.9 million (8 percent of lifetime cocaine users) have used cocaine intravenously at some time in their lives, and 2 percent have done so during the past year (326).

According to the DAWN network, injection was the route of administration in about 80 percent of heroin ER mentions and 25 percent of cocaine mentions in 1988 (fig. 2-11). It should also be noted that the closeness of such estimates should not be regarded as persuasive, because they cannot be regarded as independent estimates (i.e., different guesstimates are based on some of the same indicators or correlates of IV drug user prevalence) (282).

### *Estimates of Risk Behaviors Among Drug Abusers*

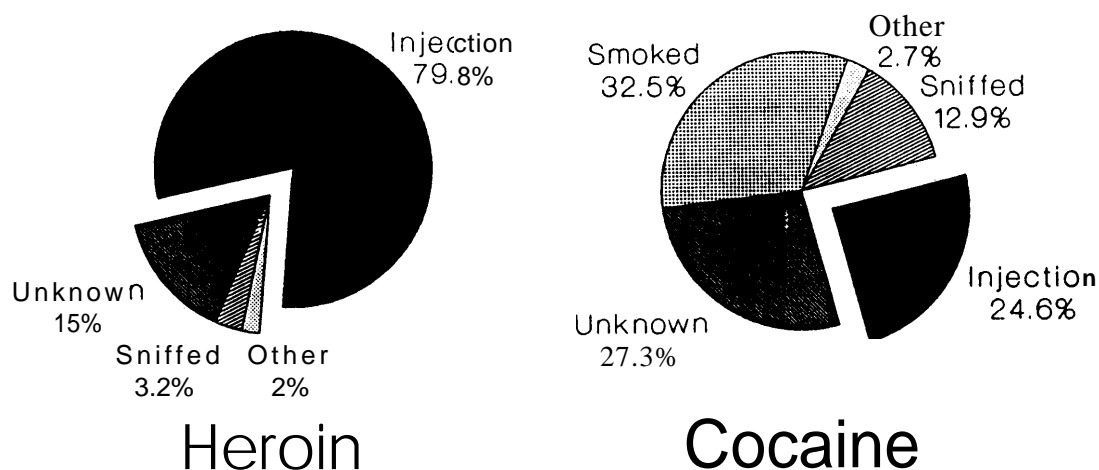
Data available from the National AIDS Demonstration Outreach Research Project, the largest outreach program for IV drug users not in treatment, document the extent of IV drug-specific use (340). Of the 16,998 IV drug users studied between 1987 and 1989, 98 percent had injected heroin or cocaine, either mixed or sequentially. Only 2 percent reported injecting amphetamines or other drugs. Of all IV drug users who reported injecting heroin or cocaine, heroin was the predominant drug for 34 percent, cocaine for 31 percent, and heroin-cocaine combinations for 33 percent. More than half (59 percent) reported daily drug injection. Heroin was the predominant drug for those who reported drug use on a daily basis (38).

Preliminary results about risk behaviors of drug abusers not in treatment come from 10 cities involved in NIDA's National AIDS Outreach Demonstration Research Project in 1989. An initial assessment was conducted of 3,724 IV drug users not in treatment to measure behaviors that place the population at risk for AIDS (325). Only 16 percent of the men and 15 percent of the women reported

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<sup>4</sup> Thirty-six States, the District of Columbia, and Guam provided estimates of the number of IV drug abusers (45).

Figure 2-11 -- Emergency Room Mentions of Cocaine and Heroin by Route of Administration, 1988



SOURCE: U.S. DHHS, NIDA (330).

that they did not share needles. Seventy percent and 63 percent, respectively, said that they had shared needles with 2 or more IV drug users during the previous 6 months. Similarly, a substantial majority of both males and females (77 and 72 percent, respectively) reported use of rented or borrowed needles, and 69 percent of males and 34 percent of females did not use new or bleach-cleaned needles. Based on a composite index of the 3,611 IV drug users who reported all of the above three risk behaviors (sharing needles using rented or borrowed needles, and not using bleached cleaned needles), 75 percent of males and 69 percent of females were classified as being at high risk for HIV infection (325). More recent data from the same project, which includes 16,998 IV drug users, showed that 78 percent reported sharing drug-injection equipment and 20 percent reported sharing with strangers (340).

Another study of needle-sharing practices among IV drug users seeking treatment in 5 cities revealed an overall prevalence of needle-sharing at least once in the past 30 days of 64 percent, with a range of 45 to 95 percent (254).

Similar patterns are reflected in the data from the Drug Use Forecasting program of the National Institute of Justice. Among male arrestees from 14

cities in the first 3 months of 1989, 81 percent of those who tested positive for opiates also tested positive for cocaine (336). Drug injection at some point during their lives was reported by 15 to 38 percent of male arrestees (table 2-2). In 10 of the 14 cities, cocaine was more frequently reported to be injected than heroin. In 11 cities, more than 20 percent of injectors reported sharing needles (336).

A self-administered anonymous questionnaire was used by departments of education in 30 States, 10 cities, and two territories from February through May 1989 to assess HIV-related knowledge and behaviors among high school students (343)<sup>5</sup>. Most students knew that AIDS or HIV infection can be transmitted by sharing needles used to inject drugs (93 to 100 percent). Rates of reported IV-drug use varied: between 2 to 5 percent of students reported ever injecting cocaine, hero@ or other illegal drugs, and 0.2 percent to 3 percent reported sharing needles to inject drugs. Despite survey limitations (e.g., a range of sampling schemes and response rates,

<sup>5</sup>School response rates ranged from 27 to 100 percent; student response rates ranged from 41 to 92 percent; and sample sizes ranged from 303 to 10&9 students (343).

**Table 2-2--Percent Self-Reported Drug Injection and Needle-Sharing in Male Arrestees, Selected U.S. Cities, January to March 1989**

City	Percent ever injected	Percent injectors who ever injected:			Percent injectors who currently share needles
		Cocaine	Heroin	Amphetamines	
Cleveland .....	17	74	71	15	15
Dallas .....	15	67	46	51	36
Detroit .....	19	60	95	5	10
District of Columbia .....	19	78	78	5	22
Indianapolis .....	17	81	44	46	26
Kansas City .....	18	66	39	61	16
New Orleans .....	18	80	69	s	33
New York .....	21	91	89	19	30
Philadelphia .....	19	83	64	44	24
Phoenix .....	25	89	57	43	20
Portland .....	30	71	64	70	29
San Antonio .....	24	68	76	36	48
San Diego .....	38	57	70	49	34
St. Louis .....	18	91	64	40	24

SOURCE: U.S. DHHS, CDC (336).

limited sample sizes, and the problem of reliability of self-reports and missed populations (those not in school), these data indicate that many students are at risk for HIV infection because they use IV drugs.

Data from the National AIDS Outreach Demonstration Research Project documented the extent of sexual practices that relate to HIV spread. Between 1987 and 1989, 29 percent of male and 34 percent of female IV drug users not in treatment reported two or more IV drug-using sexual partners. Furthermore, 59 percent of male and 48 percent of female IV drug users said that they had engaged in sexual activity exclusively with non-IV drug users. With respect to condom use, only 11 percent of men and 17 percent of women indicated that they always used condoms (325). Overall, the analysis showed a correlation between high-risk sexual behavior and high-risk drug use behavior.

### *HIV Seroprevalence Among Drug Users*

Unlike AIDS cases, which are reported to the CDC, there is no comprehensive system for monitoring the prevalence of HIV infection. According to the various assumptions used in the calculation, the estimate of HIV-infected IV drug users varies from 61,000 to 398,000 (126). The prevalence of HIV infection among IV drug users in treatment

varies widely by geographic area, with the highest rates observed in the Northeast (10 to 65 percent) and the lowest in areas of the West, Midwest and South (some areas less than 5 percent) (126). An ongoing survey of clients entering treatment in 41 clinics in 21 metropolitan areas and an examination of 7,000 sera revealed a range of seroprevalence rates among IV drug users of 0 to 48 percent, with a median rate for all clinics of 2.9 percent (4). IV drug users in clinics in New York City and Newark, however, typically had rates over 40 percent. Rates as high as 50 to 60 percent have been reported from addicts in treatment in these areas (89).

A separate study of seroprevalence in IV drug users entering treatment between 1988 and 1989 examined the association between HIV-positive status and the primary drug of abuse. It showed that although heroin was associated with the highest median HIV-positive rates (4 percent), it was followed closely by cocaine, with 3.1 percent (4).

Of the 1.8 million IV drug users estimated by the Research Triangle Institute in 1989, 902,000 were estimated to use IV drugs occasionally and an additional 893,000 individuals were estimated to use needles frequently enough to place them at risk for HIV infection (64).

*AIDS Cases Reported to the Centers for Disease Control*

The Centers for Disease Control (CDC) estimates that there are currently about 1 million persons in the United States who are infected with HIV (338). When reviewing statistics on AIDS reports, one should note that AIDS diagnosis typically lags 5 or more years behind actual infection with HIV and may not reflect the most up-to-date information on current ways the virus is spreading.

From diagnosis of the first AIDS case in 1981 through May 1990, 136,204 AIDS cases were reported to the CDC, including 2,315 pediatric eases (4).<sup>6</sup> There have been 83,145 AIDS-related deaths reported through May 1990, including 1,239 pediatric fatalities. Rates of reported AIDS cases were highest for blacks and Hispanics; for persons 30 to 39 years of age; in the Northeast region and in U.S. territories (primarily reflecting rates in Puerto Rico); in

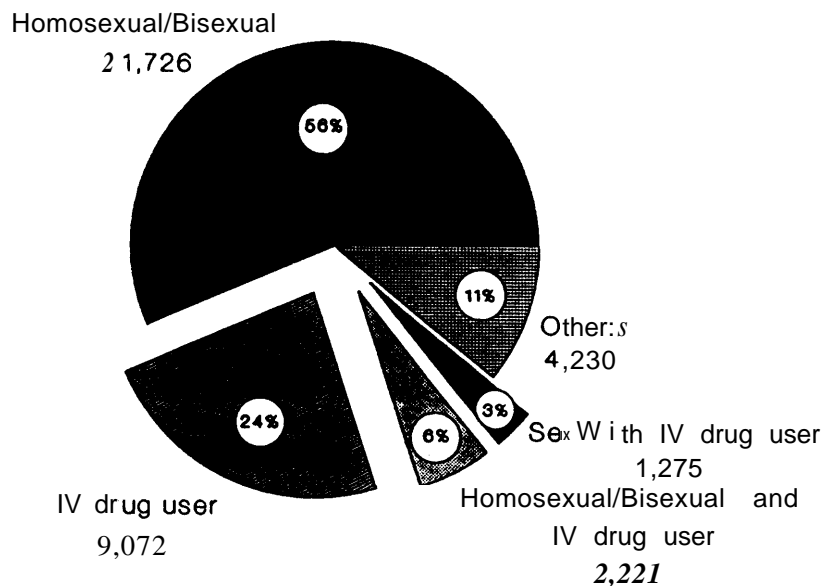
<sup>6</sup>For the purpose of the CDC's AIDS case definition, pediatric cases are those Occurng in children under the age of 13 (349).

the largest metropolitan areas; and for men. Rates vary tremendously among and within States.

**IV Drug Use as an AIDS Risk Factor**

IV drug use is the second most common risk behavior among cases of AIDS in the United States, surpassed only by men having sex with other men. In 1988 and 1989, one-third of all reported AIDS eases were associated with IV drug use (4). Between June 1989 and May 1990, health departments of the 50 States, the District of Columbia, and U.S. territories reported 12,985 cases of AIDS in IV drug users, their sexual partners, and babies born to mothers who were IV drug users or sexual partners of IV drug users. IV drug use was a risk factor in 33 percent of the 39,203 AIDS cases reported during that 12-month period. Among the 38,524 adult and adolescent AIDS eases reported from June 1989 to May 1990, 9,072 (24 percent) were female or heterosexual male IV drug users, 2,221 (6 percent) were male homosexual/bisexual IV drug users, and 1,275 (3 percent) were attributed to heterosexual contact with an HIV-infected, IV drug-using partner (see fig. 2-12). Furthermore, of the 590 pediatric

Figure 2-12--AIDS Cases in Adults and Adolescents by Risk Factor, June 1989 through May 1990



SOURCE: U.S. DHHS, CDC (349).

AIDS cases presumably associated with perinatal transmission, 70 percent (417 cases) had mothers who were IV drug users or sexual partners of IV drug users (349).

The same pattern pertains to cumulative U.S. AIDS cases reported to the CDC. Through May 1990, 27 percent of AIDS cases among adult men and 71 percent of AIDS cases among adult women were directly or indirectly associated with IV drug use (349). In addition, 71 percent of children who were presumably infected through perinatal transmission had mothers who were IV drug users or sexual partners of IV drug-users (349).

### Trends in AIDS Cases

IV drug use has been associated with a growing percentage of AIDS cases. During the 3-year period between December 1986 and December 1989, the percentage of AIDS cases reported in female or heterosexual male IV drug users increased from 17 percent to 23 percent (344,345). The increasing proportion of IV drug use in total AIDS cases from 1986 through 1989 has to some extent been mediated by the 1987 change in the CDC's AIDS case definition (see below). The increase in AIDS cases associated with IV drug use parallels an increase in cases attributed to heterosexual contact with IV drug users and an increase in AIDS cases in children of women who were IV drug users or sex partners of IV drug users (338).

### Geographic Concentrations of AIDS Cases

In 1988, 4.3 cases of IV drug use-associated AIDS per 100,000 population were reported to the CDC (335). Rates of IV drug use-associated AIDS varied widely by area; rates in Puerto Rico, New Jersey, New York, and the District of Columbia were >10 cases per 100,000 population (fig. 2-13). Rates were highest in the Northeast region, where there were almost 12 cases per 100,000 population (table 2-3). Although the Northeast represents 19.7 percent of the population of the United States and its territories, 54.5 percent of IV drug use-associated cases of AIDS were reported there (335). Reported AIDS cases associated with IV drug use were concentrated in a few large metropolitan areas; however, there is recent evidence of increasing AIDS cases in small metropolitan and rural areas (3). In several Northeastern States and Puerto Rico, the number of AIDS cases in IV drug users exceed those in homosexual men (335).

### Prevalence of AIDS Among Blacks and Hispanics

The original AIDS case definition was standardized on gay men, and until the case definition was revised in 1987, AIDS surveillance probably resulted in a large underestimation of AIDS in IV drug users, blacks, and Hispanics by failing to attribute death among these groups to AIDS (286). In spite of possible underestimation, selected racial

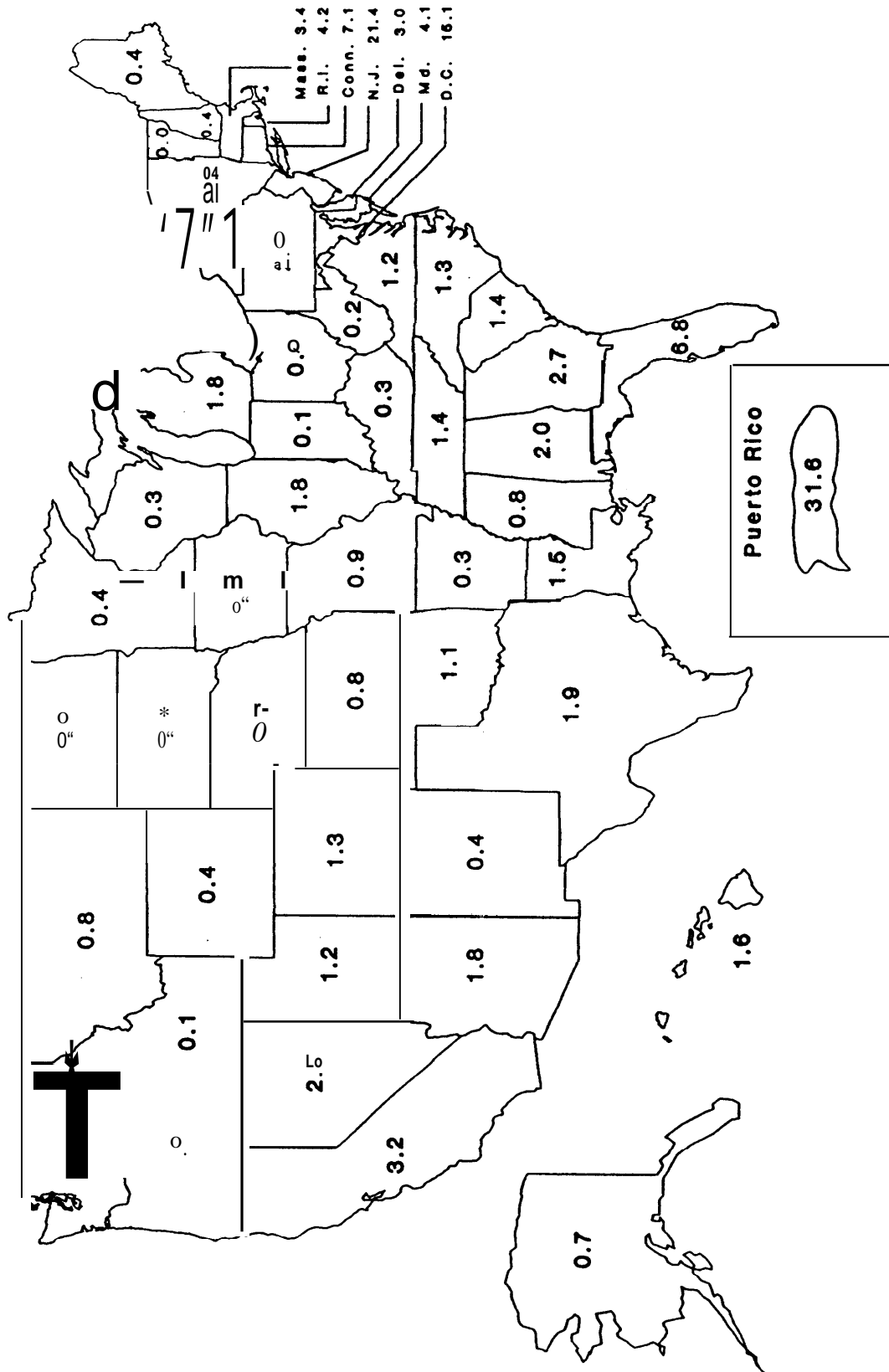
**Table 2-3-Number and Rate Per 100,000 Population of AIDS Cases Associated With IV-Drug Use, by Census Region and Race/Ethnicity, 1988**

Race/ethnicity	Number of cases (rate)				
	Northeast	Midwest	South	West	Total <sup>a</sup>
White <sup>b</sup> .....	1,203 ( 2.9)	217 ( 0.4)	687 ( 1.2)	719 ( 2.2)	2,826 ( 1.6)
Black <sup>b</sup> .....	2,929 (62.0)	294 ( 5.5)	1,318 ( 9.5)	277 (125)	4,818 (18.4)
Hispanic .....	1,699 (65.2)	69 ( 5.4)	135 ( 3.0)	159 ( 2.5)	2,062 (14.1)
Asian/Pacific Islander .....	6 ( 1.1)	0 ( 0.0)	0 ( 0.0)	6 ( 0.3)	12 ( 0.3)
American Indian/ <sup>c</sup> Alaskan Native .....	1 ( 1.2)	2 ( 0.8)	0 ( 0.0)	6 ( 0.8)	9 (0.6)
Unspecified .....	23	0	0	2	25
Total .....	5,861 (11.9)	582 ( 1.0)	2,140 ( 2.8)	1,169 ( 2.7)	9,752 ( 4.3)

<sup>a</sup> Total cases and total rates exclude territories. Rates are based on the U.S. census. Non-Hispanic.

SOURCE: U.S. DHHS, CDC (335).

Figure 2-13--Reported AIDS Cases Associated With IV Drug Use per 100,000 Population United States, 1988



SOURCE: U.S. DHHS, DC (335).



and ethnic minorities are over-represented in AIDS case reports compared with the general population. As table 2-3 indicates, the rate of IV drug use-associated AIDS is higher for blacks and Hispanics than for whites.<sup>7</sup> Blacks make up 12.2 percent of the U.S. population, but account for 27.8 percent of total AIDS cases and 45.2 percent of AIDS cases where IV drug use has been listed as a risk factor (349). Hispanics make up 8.1 percent of the U.S. population, but account for 15.7 percent of total AIDS cases and 25.9 percent of cases where IV drug use has been listed as a risk factor (349). The proportion of AIDS cases among minorities is even more dramatic for pediatric AIDS cases. Over half of pediatric AIDS cases reported through May 1990 (51.7 percent) were blacks, 25.5 percent were Hispanics, and 21.9 percent were whites (349).

### Effect of the 1987 Revision of CDC's AIDS Case Definition

CDC's 1987 revision of the AIDS case definition appears to have increased the number of AIDS cases reported in IV drug users, blacks and Hispanics, and persons living in the Northeast (337). Previously,

these groups and areas were thought to be greatly underestimated by the AIDS surveillance, because deaths among IV drug users with AIDS did not meet the earlier case definition. In August 1987, the CDC surveillance case definition for AIDS was expanded to include additional AIDS-indicator diseases (e.g., HIV dementia, wasting syndrome, extrapulmonary tuberculosis) and to accept some other indicator diseases as presumptive diagnoses of AIDS (e.g., *Pneumocystis carinii* pneumonia, Kaposi's sarcoma, esophageal candidiasis) when tests for HIV are positive (334).

Of the IV drug-use-associated AIDS cases reported in 1988, 4,682 (43.6 percent) met the case definition solely on the basis of criteria added by the 1987 case definition revision (335). The proportion of IV drug-use-associated AIDS cases has been higher in the Northeast than in other regions. Since the beginning of 1988, the number of AIDS cases associated with IV drug use has equalled or exceeded all other cases reported in the Northeast. The new criteria captured persons who eventually would progress to meet the previous definition and those who never would have met the previous definition. The latter has been noted to be particularly important in IV drug users, who may use health care services for HIV-related illness later and may die of HIV-related opportunistic infections before they are diagnosed as having AIDS.

<sup>7</sup>A future Staff Paper in the Office of Technology Assessment's AIDS series plans to analyze HIV rates among blacks and Hispanics.

**Table 2-4-Projected Number of AIDS Cases, Persons Living With AIDS, and Deaths Attributable to AIDS After Adjustment for Underreporting, 1989 to 1993<sup>a</sup>**

Year	AIDS cases		
	New cases <sup>b</sup>	Alive <sup>c</sup>	Deaths
1989 .....	44,000- 50,000	92,000- 98,000	31,000- 34,000
1990 .....	52,000 - 57,000	101,000-122,000	37,000- 42,000
1991 .....	56,000- 71,000	127,000-153,000	43,000- 52,000
1992 .....	58,000- 85,000	139,000-188,000	49,000 - 64,000
1993 .....	61,000- 98,000	151,000-225,000	53,000- 76,000
Through 1993 <sup>d</sup> .....	390,000-480,000		285,000-340,000

<sup>a</sup>Projections are adjusted for unreported diagnoses of AIDS by adding 18 percent to projections obtained from reported cases (corresponding to 85 percent of all diagnosed cases being reported:  $1/0.85=1.18$ ) and rounded to the nearest 1,000.

<sup>b</sup>Number of cases diagnosed during the year.

<sup>c</sup>Persons with AIDS alive during the year.

<sup>d</sup>Rounded to the nearest 5,000. Includes an estimated 120,000 AIDS cases diagnosed through 1988, 48,000 persons alive with AIDS at the end of 1988, and 72,000 deaths in diagnosed patients through 1988.

SOURCE: U.S. DHHS, CDC (338).

### Projected AIDS Cases

Following a meeting in Atlanta in the fall of 1989, Federal scientists revised their estimates of the number of new U.S. AIDS cases in the next 3 years. Although the number of new cases is still expected to rise sharply, the total number is expected to be 10 to 15 percent fewer than previously expected (338). The following explanations have been suggested to have contributed to the decline:

- o preliminary estimates made in 1986 by the Public Health Service were too high because data used to make the predictions were imprecise. The CDC revised estimates of Americans infected with HIV in 1986 from between 1 million and 1.5 million to about 750,000;
- o the use of drugs, such as zidovudine, has delayed the onset of AIDS symptoms that would qualify individuals for the AIDS-case definition;
- o changes in behavior to reduce the spread of AIDS, particularly among male homosexuals, have decreased the spread of the disease beyond what was expected; and
- o the epidemic has slowed because the most susceptible have already been infected (338).

CDC estimates that between 1989 and 1993 there will be somewhere between 390,000 and 480,000 new AIDS cases (338). Deaths attributable to AIDS are expected to be between 285,000 and 340,000 during that period (see table 2-4 for yearly breakdowns). Table 2-5 contains the projected number of AIDS cases by risk-behavior group from 1989 through 1993.

### Cost Estimates of Drug Abuse

Although there is little disagreement that drug abuse in the United States has become a major public health problem, estimating the cost to society is a difficult task. Over the past 20 years, numerous studies have assessed the economic costs of drug abuse and other illnesses (e.g., alcohol abuse and mental illness). These studies differed in their content, theoretical approach, and relevance to policy decisions, and worked around data limitations and the necessary assumptions involved in estimating intangible costs (108).

According to French and his co-investigators, past studies of the cost of the drug abuse problem have significantly underestimated the true cost to society by failing to estimate certain tangible costs (e.g., reduced property value in high drug use communities; the real and opportunity cost of educational programs to reduce the consequences of drug abuse; and the costs of complications related to secondary diseases, such as AIDS) (108). Because of the difficulty and controversy associated with developing methods to estimate intangible costs to the individual drug user and society (e.g., depression, extended isolation, physical disability, and other forms of pain and suffering), these have rarely been included in cost estimates. More specific costs of drug-related treatment, better information on worker absenteeism, and drug-related budgets for local, State, and Federal criminal enforcement, however, have helped to make recent analyses more accurate (188).

**Table 2-5--Projected Number of AIDS Cases by Risk Group, 1989 to 1993<sup>a</sup>**

Year	Homosexual/bisexual men		Heterosexual IV drug users	Heterosexual transmission	Pediatric
	Not IV drug users	IV drug users			
1989	26,000-28,000	2,600-2,800	11,000	2,700-2,900	1,000-1,100
1990	29,000-31,000	2,700-3,000	13,000-14,000	3,800-4,100	1,300-1,400
1991	30,000-38,000	2,600-3,300	14,000-18,000	5,000-6,400	1,500-2,000
1992	30,000-43,000	2,300-3,500	16,000-23,000	6,300-9,300	1,800-2,600
1993	30,000-48,000	2,400-3,500	17,000-27,000	8,100-13,000	2,000-3,200

<sup>a</sup>Predictions are adjusted for unreported cases.

SOURCE: U.S. DHHS, CDC (346).

The approach that most analysts have used to estimate costs of alcohol abuse, drug abuse, and mental illness is based on the cost-of-illness methodology that estimates the aggregate monetary burden to society of the health effects of illness. This methodology recognizes direct tangible costs, such as the value of resources needed to treat the disease, and indirect tangible costs, such as the value of output lost due to mortality and morbidity. Recently, researchers have used the cost-of-illness approach to measure consequences not related to health (e.g., the linkages between drug abuse and crime, motor vehicle accidents, and social welfare problems) (108).

French and his co-investigators have outlined a conceptual framework to help make the process of estimating the social costs of drug abuse more uniform and to capture some of the tangible and intangible costs that were previously not included (108). The first step of their framework calls for categorizing the adverse health and nonhealth consequences into one of three classes: physical health problems (e.g., death, brain damage, AIDS-related diseases); mental health problems (e.g., neurotic and emotional disorders); and social problems (crime, reduced job performance, family and community disruptions). The second step in their framework is the identification and classification of associated costs according to private tangible and intangible costs and external tangible and intangible costs. The final step to their approach requires selecting and developing methods to estimate each of the social cost elements. Here, French and his colleagues recommend combining and extending new and existing methods for a more comprehensive estimate of social cost.

In a contract report for the Alcohol, Drug Abuse, and Mental Health Administration, Harwood, et al., estimated the economic costs to society of drug abuse in 1983 to be close to \$60 billion (136). A substantial part of the total cost (over \$33 billion) was attributed to reduced productivity. The cost of crime attributed to drug abuse was another major contributing cost. The latest study on the cost of drug abuse by NIDA should be released in late summer 1990. (See app. F for findings from a cost-benefit analysis of drug abuse treatment.)

One of the rising costs associated with drug abuse is the treatment of addicted infants. Estimates of the number of babies exposed to illicit drugs vary. In a survey of 36 hospitals conducted in 1988 by the National Association for Perinatal Addiction Research and Education, 11 percent of pregnant women had exposed their fetuses to one or more illegal drugs, with cocaine or crack as the primary drug used (75 percent of cases) (301). Estimates of the number of infants born each year to mothers who use drugs range from 200,000 to 375,000 (41,104). The President's National Drug Control Strategy report estimates that 100,000 cocaine exposed babies are born each year (104). Some of the costs associated with fetal exposure to illicit drugs include medical treatment of fetal withdrawal symptoms, out-of-home care resulting from child abuse and neglect, and the treatment of special medical, educational, and psychological needs of drug-exposed babies.

## SUMMARY

Certain behaviors associated with IV drug use are major vehicles of HIV transmission in the United States. IV drug use is the second most common risk behavior among AIDS cases and has been associated with a growing percentage of AIDS cases. Through May 1990, 27 percent of AIDS cases among adult men and 71 percent of cases among adult women were directly or indirectly associated with IV drug use (349). Moreover, 71 percent of children with AIDS who were presumably infected through perinatal transmission had mothers who were IV drug users or sexual partners of IV drug-users (349). In several Northeastern States and Puerto Rico, the number of AIDS cases among IV drug users exceed those in homosexual men. In examining current AIDS cases, one should also keep in mind that they reflect what occurred 5 to 7 years ago. According to the CDC, many of the current cases among IV drug users may reflect the HIV epidemic among a cohort of heroin users who started heroin use in the mid-1960s to mid-1970s (335). The impact of more recent trends of IV cocaine use, which is associated with more frequent injection and needle-sharing, and the impact of crack cocaine use and associated sexual activity with the potential for increased sexual HIV transmission are yet to come.

Although each of the major studies of drug use and consequences in the United States (the household survey, high school seniors survey, and DAWN) has recognized limitations, they do provide “a general overview of the problem, follow the evolution, and point out areas in which more knowledge is needed” (293). The Senate Judiciary Committee’s recent attempt to develop a more complete estimate of the number of cocaine addicts included, in addition to the household survey estimate, estimates of cocaine addicts in drug treatment centers, the homeless population, and those who had come in contact with the criminal justice system via arrests (304).

As William Bennett remarked on the release of the 1988 National Household Survey on Drug Abuse, “There’s some very good news, and some very bad news” concerning the state of the nation’s drug problem (30). The good news is that recent surveys have found illegal casual use of most drugs to be on the decline. The bad news in this evolving story is that the number of cocaine addicts has increased in recent years, and the costs associated with drug treatment, productivity losses, and crime have risen dramatically.

The number of household members reporting current cocaine use dropped 50 percent, from 5.8 million in 1985 to 2.9 million in 1988 (330,331). Although the declining trends in casual cocaine use are indeed encouraging, new reason for concern centers on the increasing *frequency* of cocaine use among current users. Estimates of the number of addicts (people who use cocaine at least once a

week) range from 862,000 to 2.2 million (304,330). ER mentions associated with cocaine use have risen sharply in recent years (increasing fourfold from 8,831 mentions in 1984 to 46,020 mentions in 1988)(329).

According to 1988 household survey data, 2 million people (about 1 percent of the population) have tried heroin at least once during their lifetimes (330). Heroin ER mentions increased much more slowly than cocaine mentions, and in 1985, cocaine surpassed heroin as the most frequently mentioned drug in ER episodes (329).

The estimated number of IV drug users in the United States ranges from 1.3 to 1.8 million (64,145). A major route of HIV transmission in this group is the sharing of injection equipment. Sharing of injection equipment, which occurs for practical, economic, and social reasons, is a common practice throughout the country in both low and high HIV seroprevalence areas. Various studies reported sharing rates ranging from 70 to 100 percent (8). DAWN statistics show that injection was the route of administration in about 80 percent of heroin ER mentions and 25 percent of cocaine mentions in 1988 (328). Prevalence and trends in IV drug abuse are not well documented, but of great importance given the connection with HIV spread. The potential for rapid escalation of HIV infection among IV drug users, as did occur in New York City, Thailand, and elsewhere, is always a possibility. Intense prevention efforts are necessary to control further spread of HIV among those not yet infected.