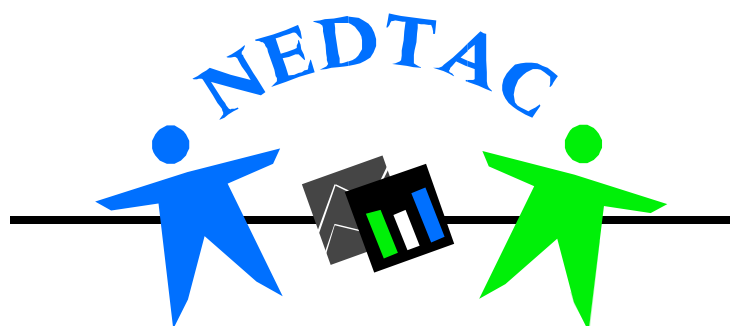


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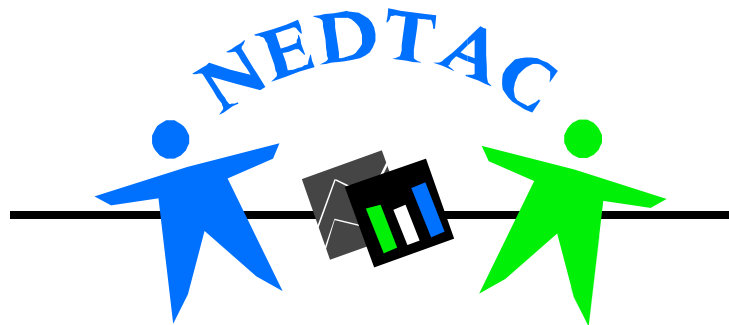
**EPIDEMIOLOGY AND TREATMENT OF
METHAMPHETAMINE ABUSE IN CALIFORNIA:
A REGIONAL REPORT**

February 1998

CSAT
Center for Substance
Abuse Treatment
SAMHSA

**UCLA
Drug Abuse
Research Center**

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CSAT
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Abuse Treatment
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FOREWORD

Methamphetamine use and abuse in California has risen significantly in recent years to the point that it is now a major public health concern in the state. Between 1993 and 1994, for example, methamphetamine-related deaths doubled in several California cities, as related hospital visits nearly tripled. Methamphetamine was the primary illicit drug problem reported in California public substance abuse treatment centers in 1994-1995. These facts, combined with the drug's expanding popularity among non-traditional groups and younger users, necessitate a better understanding of the drug, its use, and how methamphetamine users and abusers respond to treatment services.

Toward this end, the Center for Substance Abuse Treatment (CSAT), through its National Evaluation Data and Technical Assistance Center (NEDTAC), funded the UCLA Drug Abuse Research Center study of methamphetamine use in California, including the history and physiological effects of the drug, demographic characteristics of users, and treatment outcomes. The report presents the results of this study and the research, policy, and practice implications of its findings. The study utilized data from several national and state-specific sources, including the 1991 National Household Survey on Drug Abuse, the California Hospital Discharge Data System, the California Alcohol and Drug Data System, the Drug Abuse Warning Network, and the Public Statistics Institute.

We wish to thank M. Douglas Anglin, Ph.D., Ari Kalechstein, Ph.D., Margaret Maglione, M.P.P., Jeff Annon, M.A., and Robert Fiorentine, Ph.D. from the UCLA Drug Abuse Research Center. We also wish to thank Charlene S. Lewis, Ph.D., Ron Smith, Ph.D., Karl D. White, Ed.D., and Arthur Anderson, Program Evaluation Branch, CSAT, for their overall guidance, review, and comments. Appreciation is also expressed to Brian Perrochet, Janice Pride, Eunice Chang, and Armine Chaparayan for assistance in preparation.

Sharon Bishop
Project Director
National Evaluation Data and
Technical Assistance Center (NEDTAC)

AUTHORS' PREFACE

The rise of methamphetamine use and abuse has been dramatic in recent years; yet limited reports exist that describe the extent and distribution of users of methamphetamine, their characteristics, and their response to treatment interventions. This paper was written with support from the National Evaluation Data and Technical Assistance Center (NEDTAC), a national resource center funded by the Substance Abuse and Mental Health Services Administration (SAMHSA) Center for Substance Abuse Treatment (CSAT) and operated by Caliber Associates. Additional support was provided by the Robert Wood Johnson Substance Abuse Policy Research Program. This report documents what is known about the epidemiology of methamphetamine abuse and its treatment in California, a state in which methamphetamine use has long been endemic.

As a result of the high interest in cocaine abuse during the 1980s and early 1990s, methamphetamine use and abuse was not viewed as a concern of national significance. As use has become more widespread, a greater awareness of the problem has inspired policymakers, legal officials, and service providers to focus increased efforts toward the personal and societal effects of this drug. This emerging interest may be attributed to many factors; for example, the ease with which the drug may be manufactured and procured, the dissemination of reports that indicate increased prevalence of methamphetamine use and abuse, and the rising health costs associated with methamphetamine use.

In this report, we describe for California the extent of methamphetamine use and the demographic profile of methamphetamine users and abusers, including their psychiatric, psychosocial, and substance abuse histories. We also examine their response to treatment. As background, we provide a review of current literature on the neurologic, medical, and psychiatric after-effects of methamphetamine use.

Ideally, the reported findings will enable substance abuse researchers, treating clinicians, and policymakers to obtain greater insight into this emerging drug abuse and its associated problems. Integration of these data, together with the findings from treatment-oriented research and studies at the molecular level, will likely facilitate the development of improved strategies for the prevention and treatment of methamphetamine abuse. Although we have attempted to provide comprehensive, current information in this report, we realize that this type of project will need periodic updating in order to keep abreast of developments associated with metham-

phetamine use. We welcome any suggestions that are aimed toward the improvement of later versions of this report. The report may be obtained by contacting NEDTAC at 1-800-7-NEDTAC.

EXECUTIVE SUMMARY

Several regions across the United States have seen a significant increase in methamphetamine use recently. Because of its potency, easy availability, low cost, and wide publicity surrounding its use, the popularity of the drug has increased to such a degree that, for the first time, the National Drug Control Strategy of 1996 directed attention to its abuse. Heightened concern regarding this drug was driven by several developments, including marked increases in the numbers of methamphetamine-related deaths and emergency hospital visits, proliferation of clandestine laboratories, and comorbidity of infectious diseases (e.g., HIV-infection, hepatitis) as a result of injection drug use.

Prior to the recent Federal-level interest in methamphetamine abuse, problematic use of this drug had been widespread in some geographic regions and among several subpopulations. Only in the last 3 years, however, have prevention, treatment, and drug policy officials directed significant resources to study methamphetamine use and its effects. In the 1980s and early 1990s, other drugs, particularly cocaine, received greater attention.

As a result of the previously limited interest in the effects of methamphetamine use, there is a paucity of information about factors related to the initiation, progression, and cessation of use, the extent of use, characteristics of users, the need for prevention and treatment services, the utilization of treatment and other related services by different populations, and data on short- and long-term treatment outcomes. To assess the state of current knowledge regarding methamphetamine, the Center for Substance Abuse Treatment convened a national meeting in June 1996, and the Office of National Drug Control Policy initiated a series of meetings in the winter of 1996 and spring of 1997.

As part of the effort to document what is known about methamphetamine use, this report presents epidemiological data for California and examines the issues related to the treatment of methamphetamine abusers through the secondary analysis of available state data. We also review the history of methamphetamine use, its manufacture, and the medical, neurologic, psychiatric, and neuropsychological effects of methamphetamine use. Based on the findings of our analyses and the review of the literature, we offer in this Executive Summary a commentary regarding current knowledge of the effects of methamphetamine use and abuse and suggestions for future research.

Should Methamphetamine Be Targeted as a Major Drug of Abuse?

Although methamphetamine is still not in widespread use throughout the United States, analyses of all available data sets indicate that it has become a major drug of abuse, especially in California. General epidemiological surveys conducted by the National Household Survey on Drug Abuse indicate that more than 1 in 10 Californians had used methamphetamine at least once. Moreover, 1 in 50 had used within the 12 months prior to the survey. Along with the general increase in methamphetamine use, striking increases were observed in methamphetamine-related hospital admissions, seizure activity, and deaths. Amphetamine-related emergency admissions tripled from 1984-85 to 1993-94 (Cunningham & Thielemeir, 1995; Cunningham & Thielemeir, 1996). From 1984 to 1994, drug enforcement officials reported dramatic upswings in the number of laboratory seizures (400% increase) and in the amount of methamphetamine confiscated (700% increase). The Drug Abuse Warning Network reported that methamphetamine-related deaths in Los Angeles, San Diego, and San Francisco counties doubled from 1993 to 1994, while total drug-related deaths remained stable over this time period.

The demographic profile of methamphetamine users is now more diversified. In previous years, the majority of methamphetamine users were less educated whites who were likely to occupy lower socioeconomic strata. Now, in addition to this group, data from the California Alcohol and Drug Data System (CADDSS), Drug Use Forecasting Project (CALDUF), and Drug and Alcohol Treatment Assessment (CALDATA) indicate that other significant cohorts of methamphetamine users include Latinos and gay/bisexual males. Moreover, although most methamphetamine abusers are typically in older age groups, one in four is likely to be under 25 years old.

Analysis of the data from CADDSS revealed that the marked increase in epidemiological indicators of methamphetamine abuse has been paralleled by an increase in the number of admissions to publicly-funded treatment centers in California. In fact, in terms of illicit drugs of abuse, methamphetamine was the primary drug problem for those admitted for treatment throughout the state in 1994-95. This rise in admissions occurred across ethnicities, but was especially notable among Latino methamphetamine abusers. Geographically, the greatest absolute number of methamphetamine abusers admitted to treatment were from the Southern California Coastal region; however, methamphetamine abusers comprised the highest percentage of admissions in the Northern California, Inland Empire, and Central Valley regions.

Individuals who entered treatment for methamphetamine use were likely to be white and unemployed. Most were older than 25 years of age, although approximately one-half to one-third were aged 18 to 24 years. Age, race, and gender were modestly associated with route of administration in that injectors were somewhat older, more likely to be white, and less likely to be Latino; women were less likely to be injectors or smokers of methamphetamine. San Franciscans and heroin users were more likely to inject the drug, while Angelenos and San Diegans were more likely to smoke or insufflate (“snort”) methamphetamine.

Methamphetamine abusers who entered treatment were more likely to use residential or outpatient programs than day treatment or hospital programs. Except for opiate users, they were slightly less likely to be retained in treatment for extended periods than were other types of drug users.

With respect to the frequency and types of treatment received by participants from a forensic sample, data from the adult and adolescent CALDUF projects revealed that most of the methamphetamine-using arrestees had not received any type of substance abuse treatment. Fewer than 10 percent of the methamphetamine users in these cohorts had received treatment for methamphetamine abuse; rather, adults had been treated primarily for alcohol abuse. Moreover, greater than 60 percent of the study participants who identified themselves as methamphetamine-dependent *also* did not believe that they required any type of substance abuse treatment at the time of the interview.

CALDATA and Target Cities Treatment Enhancement Program (TCTEP) studies, which were formulated to assess the effectiveness of substance abuse treatment programs in California, revealed that the participating programs had varying success rates with methamphetamine abusers. Notably, CALDATA showed 60 percent of the methamphetamine abusers were likely to relapse within 12 months of completing their treatment, while TCTEP (restricted to Los Angeles and containing a much smaller sample) showed that 35 percent of the methamphetamine abusers relapsed in this period. In stark contrast to the data from CALDATA and CALDUF, the TCTEP revealed that 56 of the 57 methamphetamine abusers studied had unsuccessfully engaged in some type of outpatient treatment prior to their enrollment in outpatient programs included in the TCTEP study. The CALDATA study suggested that the lower rate of treatment success may be due in part to the fact that many methamphetamine abusers seem to enter treatment because of pressure from external forces (e.g., criminal justice system, significant other) rather than a personal commitment to recovery. TCTEP findings conservatively suggest that higher client satisfaction with treatment was associated with a lower risk of relapse.

CALDATA revealed that if methamphetamine abusers entered treatment, they were equally likely to use inpatient or outpatient treatment programs and were exposed to the following treatment services: individual or group counseling, activity groups, educational courses, and 12-step involvement. They experienced somewhat greater difficulty in completing these programs than users of other drugs. If methamphetamine abusers did not complete their treatment program, it was most likely because they relapsed or were asked to leave.

In comparison to users of other drugs, methamphetamine abusers attended the same types of 12-step/self-help meetings with a similar degree of frequency; however, they were marginally more likely to leave treatment prior to its completion. Most often, methamphetamine abusers who dropped out reported that treatment was not helpful or that they had relapsed during the course of treatment. In the 12 months following treatment, in comparison to other drug users, methamphetamine abusers were more likely to have psychiatric and legal difficulties, family problems, and greater dissatisfaction with their lives.

Taken together, the findings from each of these studies reveal that methamphetamine abuse has increased to such a level that it has become a major public health concern for the state, and the problem may be worsening. Production of methamphetamine in California continues to rise; the demographic profile of methamphetamine users is likely to broaden further; and concomitant upswings in methamphetamine-related deaths and requests for treatment of methamphetamine abuse/dependence are likely to continue. While programs that treat methamphetamine abuse/dependence have generally performed as well as treatments for other drugs of abuse, improvement is possible. The limited success of these treatments may be due to the limited knowledge of the neurophysiological effects of methamphetamine in humans, which is summarized in the next section.

The Effects of Methamphetamine on Human Neurologic, Medical, Psychiatric, and Neurocognitive Functioning

A rich literature based on animal models strongly suggests that methamphetamine has long-lasting and dramatic effects on brain metabolism and structure, but the neurological effects have not been examined methodically in humans. Cardiac difficulties and increased risk of stroke have been observed in methamphetamine abusers. Psychiatric disorders, including psychosis and depression following cessation of use, have been clinically documented in samples of methamphetamine abusers; yet, comprehensive evaluations of the psychiatric after effects of methamphetamine abuse have not been conducted. Neurocognitive effects and changes in brain

structure and metabolism have been observed in some studies following the cessation of use of less powerful stimulants, such as cocaine; similar studies on methamphetamine are just now underway.

The dearth of research regarding the neurologic, medical, psychiatric, and neurocognitive effects of methamphetamine in humans has likely restricted treatment providers' capacity to intervene more effectively with methamphetamine abusers. Because treatment providers do not know the long-term effects, if any, of methamphetamine abuse on neurophysiology and neurocognition or the specific mechanisms that underlie these effects, treatment providers are constrained in their efforts to formulate effective interventions. An improved understanding of the neurophysiological effects of methamphetamine will suggest mechanisms by which such changes affect tolerance, craving, and relapse and which medication and behavioral treatments could be developed that would compensate for and circumvent these difficulties.

Not only do the research data strongly imply that public health officials should rethink their strategies for the treatment of methamphetamine abuse, but the data also indicate that our current prevention strategies are not reducing the incidence of and prevalence of methamphetamine use and abuse. As such, several issues should be considered with respect to the formulation and implementation of prevention strategies for methamphetamine abuse.

Considerations for Prevention Strategies

The epidemiological data summarized for California offer useful information regarding the user groups to be targeted for intervention. Clearly, methamphetamine is no longer used solely by low socio-economic status, less educated, heterosexual whites; rather, marked increases in use have been documented for Latinos and gays. More importantly, based on the data from juvenile forensic samples and anecdotal evidence from drug courts, greater numbers of adolescents are abusing methamphetamine.

Given these data, what might be the most efficient means of reducing the incidence of methamphetamine abuse? One strategy would be to target grade school youth prior to the ages when they are at risk for abuse. For example, Botvin and colleagues (1995) demonstrated that intensive skills and educational programs reduced adolescents' use of tobacco, marijuana, and alcohol. Moreover, polysubstance-abusing adolescents were less likely to use multiple substances after completing the training program.

To increase the likelihood of effective prevention, programs need to be sensitive to inter- and intraculture differences among methamphetamine users. Gil-Rivas, Anglin, and Annon (1997), studying a sample of incarcerated Latinos from 13 jail sites across California, demonstrated intragroup differences within the cohort that could prove to be useful in the development of treatments for particular Hispanic subgroups.

Educational differences across groups of methamphetamine abusers may also be an important index with respect to the development of prevention and education programs. Simpler, behavior-oriented programs might be more appropriate for less-educated individuals, whereas more complex, insight-oriented programs might be more appropriate for those methamphetamine abusers with higher levels of education.

Conclusion

Methamphetamine use and abuse clearly has become a public health concern of national significance. In California, methamphetamine is being used across a wide span of age groups, among many ethnic groups, and in all substate regions. Current treatments for methamphetamine abuse and dependence are modestly successful at best, and for certain classes of users, are often unsuccessful. The present state of affairs has occurred in part because of limited data on the acute and chronic neurophysiological and neurocognitive effects of methamphetamine, the psychosocial factors that influence the likelihood of methamphetamine use, and the specific types of treatment that reduce the probability of relapse.

Improved strategies for dealing with methamphetamine abuse would be aided by a multi-pronged research strategy aimed at increasing the effectiveness of programs and exploring the long-term, neurophysiological effects of methamphetamine use and abuse on humans. Prevention strategies, such as those employed by Botvin and colleagues, could be implemented in the form of pilot programs across different regions of the state to determine their effectiveness. Studies with children and adolescents could further identify the factors that place children and adolescents at risk to use methamphetamine. The rich literature documenting the neurophysiological effects of methamphetamine in animals should be translated into human-based research in order to clarify the drug's acute and long-term effects on the brain. Findings from such studies could be employed to design treatments that could take into account the neurophysiological and neurocognitive changes associated with methamphetamine abuse and the psychosocial factors that lead to relapse. Continued research into the demographic profile of methamphetamine abusers, the effectiveness of various treatment and prevention strategies, and the illegal activities associated with methamphetamine will enable basic researchers, treatment providers, prevention

strategists, and policymakers to stay abreast of use, consequence, and recovery trends associated with this drug.

I. BACKGROUND

Methamphetamine use has risen dramatically over the past few years in several regions across the United States. Because of its potency, easy availability, low cost, and attendant publicity, the popularity of methamphetamine has increased (Miller, Millman, & Gold, 1989) to such a degree that, for the first time, the National Drug Control Strategy of 1996 has directed attention to its abuse.

Prior to indications of an increase in methamphetamine consumption, problematic methamphetamine use had been endemic in some geographic regions and among several subpopulations. Only in the last few years, however, have methamphetamine use and its effects captured the wide attention of drug policy, enforcement, prevention, and treatment officials. In the 1980s and early 1990s, other drugs, particularly cocaine, received greater attention.

A number of concerns have fueled the burgeoning interest in the physiological, medical, cognitive, and psychosocial effects of methamphetamine use. This developing interest was partially driven by the considerable evidence that has documented increases in methamphetamine use, the proliferation of clandestine laboratories seized by enforcement agencies, a high morbidity and mortality associated with this drug (Anglin, 1988; Office of National Drug Control Policy, 1990; Tonry & Wilson, 1990), and a presumed connection between methamphetamine use and criminal involvement (e.g., violence). For example, from 1991 to 1994, the number of methamphetamine-related deaths reported in the nationwide Drug Abuse Warning Network (DAWN) nearly tripled; during this same period, a similar increase was observed in the number of methamphetamine-related visits to hospital emergency departments. At the same time, law enforcement agencies in California reported a six-fold increase in seizures of methamphetamine, and community drug programs reported trebled client admissions for methamphetamine abuse and dependence.

In particular, concerns regarding mortality and morbidity have been heightened because of the spread of HIV-1 infection, tuberculosis, and hepatitis among users of drugs by injection, a common route of administration for methamphetamine (Curran et al., 1988; Des Jarlais & Friedman, 1987; Des Jarlais, Wish, & Friedman, 1987; Holmes, Karon & Kriss, 1990; Schoenbaum, Hartel & Selwyn, 1989). Finally, recent evidence suggests an upswing in the importation, availability, and use of methamphetamine, beyond former historical boundaries, to many other cities in the west and the midwest (National Institute on Drug Abuse, 1996).

Despite the increasing incidence of methamphetamine use across the country and its long history of abuse in specific regions of the United States (e.g., San Diego, Portland) and among specific groups (e.g., motorcycle gangs, truckers, construction workers, surfers, gay men), little information exists on the epidemiology of methamphetamine use, characteristics of the users, and the dependence and treatment histories of methamphetamine users. Furthermore, limited data exist regarding the patterns of drug use, employment, and criminal behavior of methamphetamine users during their drug use careers. Only isolated treatment outcome studies have been conducted to determine the effectiveness of community-based treatments for this drug with respect to the reduction of methamphetamine use, changes in psychosocial functioning, and/or the reduction of high-risk behaviors for HIV transmission (e.g., injection drug use, unprotected sex).

Given the relatively small number of studies in the existing literature on the extent of methamphetamine use or the efficacy of interventions for methamphetamine users, several Federal agencies have convened meetings to assess the state of current knowledge on methamphetamine use. The Center for Substance Abuse Treatment (CSAT) held a 2-day national conference in June 1996 (Lukas, 1996), the National Institute of Drug Abuse held a Western regional meeting in December 1996 (Condon, personal communication), and the Office of National Drug Control Policy (ONDCP) held a Western Regional Meeting in January 1997 and a National meeting in March 1997 (McCaffrey, personal communication). The funding of this study is one outcome of these meetings.

Historically, methamphetamine abuse has been especially prevalent in California (Cunningham & Thielemeir, 1995), where considerable data have been accumulated relevant to empirically defining methamphetamine use and its effects. As part of the continuing effort to document what is known about methamphetamine use, this report presents the available epidemiological data for California and examines the effectiveness of treatments for methamphetamine users through the secondary analysis of state data. We begin with this background section that details the history of methamphetamine use, how methamphetamine is manufactured, how the drug interacts with the body, and the potentially harmful effects of the drug with respect to abuse and dependence, high-risk behaviors, physiological effects, and neuropsychological effects. Next, we review the epidemiology of methamphetamine use in California with an emphasis on the overall incidence and prevalence of use, provide an analysis of the demographic variables (e.g., geography, race, age, education, socioeconomic status (SES), and HIV-status), characterize those who may be at risk for methamphetamine dependence, present data regarding special populations (e.g., gay and bisexual males, adolescents, arrestees), and discuss psychiatric and medical issues. We then focus on issues related to the treatment of

methamphetamine abuse, such as the characteristics of incoming clients, changes in these characteristics over time, and treatment utilization and outcome. Finally, we conclude with a discussion on population subgroups that are at significant risk for methamphetamine use, where prevention efforts might be focused, and the effectiveness of treatment with respect to relapse and post-treatment functioning.

1. HISTORY OF METHAMPHETAMINE

Amphetamine, the predecessor to methamphetamine, was first synthesized in 1887 and became commercially available in 1932 as a nasal spray for the treatment of asthma (Beebe & Walley, 1995). The stimulant properties of the drug were recognized immediately and led to additional medical and functional applications in which more potent forms of the drug were developed, including methamphetamine, to enhance performance. For example, during World War II, German and Japanese pilots used methamphetamine to stay awake for long periods of time (Spotts & Spotts, 1980). In the United States, during the 1950s and 1960s, amphetamine and methamphetamine were viewed as “utilitarian drugs” that working-class and upper middle-class individuals used to increase their energy and meet performance goals, or, particularly for women, to reduce appetite and weight (Brecher, 1972; Morgan, 1996; Spotts & Spotts, 1980). Following the increase in such accepted uses of amphetamine and methamphetamine, reports of casual use and abuse from diverted pharmaceutical supplies became common. In subsequent decades, such abuse created a black market demand that stimulated the illicit production of methamphetamine.

In response to the increased illicit production and use of methamphetamine, the government passed legislation to control these adverse developments. The Federal Controlled Substance Act of 1970 was the initial legislation enacted to regulate the production of this class of stimulants and reduce their abuse. However, the effects of the legal action were limited because the materials and equipment required to produce methamphetamine are inexpensive and the active ingredients needed to prepare the drug are relatively easy to obtain. Moreover, clandestine manufacturers developed alternative methods of methamphetamine production that were not covered under the law.

Subsequently, during the late 1980s, an increased number of illegal, makeshift methamphetamine laboratories appeared in rural communities in states on the west coast (Cunningham & Thielemeir, 1995). In a further attempt to diminish the production of methamphetamine, the Chemical Trafficking and Diversion Act of 1988 amended the 1970 legislation to require wholesalers to record imports and exports of some of methamphetamine’s

chemical precursors, including ephedrine, pseudoephedrine, phenylacetic acid, benzyl cyanide, and benzyl chloride (Peterson, 1996). However, these chemicals still may be obtained easily outside the United States. In particular, the continued availability of precursor chemicals in Mexico has recently increased the level of illicit production there, and increasing amounts of methamphetamine are now smuggled into the United States.

2. MANUFACTURE OF METHAMPHETAMINE

Methamphetamine is easily manufactured using low-cost equipment and easily obtainable precursor chemicals. Currently, the most common method uses ephedrine or pseudoephedrine as a precursor; previously, some methamphetamine was produced from the precursor phenyl-2-propanone (P2P; Irvine & Chin, 1991). As the process of manufacturing methamphetamine from P2P created noticeable fumes, clandestine labs were frequently located in rural areas. In contrast, when ephedrine is used as a precursor, the fumes are less noticeable and production by this method has been conducted in less isolated areas, such as garages, motel rooms, and vans in urban and suburban areas (Morgan, 1996).

Although illicit producers of methamphetamine gradually devised methods that reduced the amount of fumes created by methamphetamine production, the manufacturing process poses serious dangers to individuals who produce methamphetamine, as well as uninvolved third parties. Many of the chemicals used in the production process are corrosive, flammable, or explosive (Irvine & Chin, 1991), and, together with waste materials from the manufacturing process, contaminate the environment; the resultant clean-up costs usually are absorbed by the taxpayer. Production workers often lack the knowledge or skills to manage the synthesis of methamphetamine correctly, thereby increasing the dangers associated with the process. For example, in a recent incident in San Bernardino County, three small children died in an explosion of a methamphetamine production lab that their parents had constructed in the family trailer (Constantine, 1997). Moreover, inadequate quality control during the manufacturing process can lead to contamination of the methamphetamine product by a number of chemicals that can be injurious to the consumer.

3. HARMFUL EFFECTS OF METHAMPHETAMINE

Although the research in this area is sparse, the literature suggests that methamphetamine abuse will likely lead to a number of physical, psychological, and behavioral consequences. In this section, we begin with a brief discussion of issues related to abuse and dependence on methamphetamine. Next, we review studies that have examined the medical, psychiatric, and

neurologic after-effects of methamphetamine abuse. We then evaluate studies that have focused on HIV-risk behaviors related to methamphetamine use and abuse.

3.1 Abuse and Dependence

Similar to other drugs, moderate chronic use or severe short-term use of amphetamines in any form may lead to abuse or dependence with physiological, psychological, and behavioral components (Ellinwood, 1974; Hall, Uchman, & Dominguez, 1988; Kramer, 1969). Like cocaine, abuse patterns for amphetamine suggest an estimated 2- to 4-year latency period between first use and full dependence. Once dependent, users often prefer amphetamines over other drugs, and sometimes over food and sex (Hall et al., 1988). Craving for the drug effects tends to persist, even after detoxification, and abuse patterns are frequently of the binge variety. Work performance and social and family relations can be affected, and the risk for arrest and conviction on drug-related charges increases.

3.2 Medical Effects

Methamphetamine can adversely affect major organ systems, especially the heart and the lungs. King and Ellinwood (1992) reported that methamphetamine significantly raises systolic and diastolic blood pressure. Tachycardia and erratic heartbeat often occur following high doses. Lukas (1996) reported that methamphetamine use is associated with heart attack and cardiomyopathy.

Changes in the respiratory system may occur as a result of methamphetamine abuse. A common sequela of methamphetamine abuse is pulmonary edema, which is described in lay terms as fluid in the lungs (Lukas, 1996). Lung capacity gradually is reduced as a function of long-term methamphetamine abuse; in turn, as the body attempts to compensate for the reduction in lung capacity, a number of changes occur that result in pulmonary hypertension.

Another possible effect of methamphetamine abuse is hyperpyrexia, an increase in body temperature--rising up to 109 degrees in some cases (King & Ellinwood, 1992). This disorder, which is related to changes in the functioning of the anterior hypothalamus, may cause cerebral hemorrhaging, convulsions, brain damage, coma, and death.

Finally, these and other organ systems also may be affected by impurities in the manufacturing process of methamphetamine. For example, lead poisoning may occur as a result of this element's introduction into the methamphetamine manufacturing process.

3.3 Psychiatric Effects

A number of psychiatric conditions can be precipitated by or exacerbated by methamphetamine use. The most extreme of these is amphetamine psychosis, a disorder that was described initially by Connell (1958). This syndrome, which is most prominent in chronic and/or heavy users, is considered to be an analog of paranoid schizophrenia, given the similarity of the acute clinical features (e.g., auditory and visual hallucinations, delusions of persecution, and ideas of reference), the probability of relapse after symptom resolution, and the response to anti-psychotic medication (Sato, 1992).

Recent studies have shown that psychosis and other psychiatric symptomatology may persist even after individuals have discontinued their use of the drug. Wada and Fukui (1990) found that affective disorders, enduring personality changes, anxiety, and fretfulness were most likely to persist in individuals who had used methamphetamine for at least 5 years. Iwanami and colleagues (1994), in a study of 104 patients who were hospitalized for methamphetamine-induced psychosis, found that these symptoms persisted in 16 percent of the patients for at least 3 months after cessation of methamphetamine use. Because these studies did not control for patients' premorbid history (i.e., psychiatric history prior to methamphetamine use, psychiatric history of first-degree relatives), it seems prudent to interpret these findings conservatively; nonetheless, they present compelling evidence regarding the long-term psychiatric effects of methamphetamine abuse.

Long-term use of methamphetamine also increases vulnerability to a psychotic break in former users who have suffered an earlier psychotic episode. Specifically, former chronic users who resumed limited levels of methamphetamine use (with smaller doses than previously used) were likely to suffer a relapse of psychotic symptomatology, even after a single dose (Sato et al., 1983; Sato, 1992).

3.4 Neurologic Effects

Lukas (1996) reported a dearth of published data on the specific effects of methamphetamine on human behavior. To our knowledge, *no* studies have examined the effects of methamphetamine on neuropsychological functioning, although some results are available from investigations of human neurology and findings from related animal studies.

Research investigating the effects of methamphetamine and stimulants on neonates revealed the presence of central nervous system (CNS) abnormalities. A study of 35 infants

exposed to stimulants showed significantly lower scores on a standardized test of visual recognition in comparison to the scores attained by a control group (Struthers & Hansen, 1992). An echoencephalographic study of neonates who were exposed prenatally to cocaine or methamphetamine indicated higher rates of bleeding, decay, and lesions in the brain (Dixon & Bejar, 1989). Oro and Dixon (1987) found that maternal use of methamphetamine and other stimulants was associated with reduced neonatal birth weight, body length, and head circumference.

With regard to adults, Caplan (1988) reported an association between intracerebral hemorrhage and methamphetamine use. Case reports have shown intracranial bleeds and strokes related to methamphetamine use in relatively young adults, even when pre-existing vascular malformations were not observed (Rothrock et al., 1988). Intracranial bleed(s) or stroke(s) can produce tissue damage with related cognitive and behavioral effects.

More subtle neurological changes can also occur. For example, Iyo et al. (1993) utilized a radioactive tracer to examine the effects of methamphetamine on D₂ (i.e., dopamine) receptors in brain areas, such as the frontal cortex and the striatum, in six methamphetamine users and six age-matched normal controls. Although the groups did not differ with regard to the absolute number of D₂ receptors in the striatum, the ratio of D₂ receptor binding availability in the striatum to that of the cortex was lower for methamphetamine users in comparison to the controls. These findings allow us to speculate that such neurophysiological changes may underlie the cognitive and emotional deficits that are reported by methamphetamine abusers in the absence of obvious tissue damage.

Animal studies, which are much more carefully controlled than studies using human participants, have shown more striking results. Seiden and colleagues (1976) demonstrated significant depletion of neurotransmitter levels, particularly dopamine, in primates 3 to 6 months after a high-dose regimen of methamphetamine similar to that used by humans. Not only were these findings replicated by other researchers in animal studies (e.g., Ricaurte et al., 1980), but decreased levels of dopamine and serotonin were evident in primate brains even 4 years after the cessation of methamphetamine administration (Woolverton, Ricaurte, Forno, & Seiden, 1989). A recent *NIDA Notes* (1996), which included commentaries by Drs. Seiden and Ricaurte, summarized the findings of 20 years of research on the effects of methamphetamine on the dopamine and serotonin systems in animals by stating that the axons of neurons containing these neurotransmitters are “pruned” and that these changes are “essentially permanent.”

3.5 Methamphetamine-related Behaviors Increasing Risk of HIV Transmission

Methamphetamine can be administered intranasally, ingested, smoked, or injected. Although 54 percent of California users insufflate the substance as a white powder and another 21 percent smoke “crystal meth,” a recent study reported that approximately 20 percent of methamphetamine users inject the drug (Cannon, 1996). Among the myriad health risks associated with injection drug use, the two that pose the greatest threat to users’ health are HIV-1 infection and hepatitis, transmitted primarily by needle sharing and by participation in high-risk sexual behaviors. For example, a small ethnographic study of gay male methamphetamine users in Los Angeles found that 54 percent of the 63 participants were injectors (Eggen, Reback, & Ditman, 1996). All participants used crystal methamphetamine during their sexual activities to intensify sexual acts, heighten pleasure, lengthen the duration of intercourse, and lessen their inhibitions. Coincidentally, 54 percent of the study participants were HIV-seropositive. Although the study did not establish levels of increased seropositivity due to methamphetamine use, this rate is substantially higher than that for the general population of gay men in Los Angeles (Longshore, 1996).

II. EPIDEMIOLOGY OF METHAMPHETAMINE USE IN CALIFORNIA

National epidemiological studies indicate that methamphetamine use is more widespread and severe in California compared to other regions of the United States. This trend is consistent across an array of data sources, including records of hospital admissions and discharges, coroner reports, laboratory seizures, and other epidemiological investigations within California, including the prevalence of methamphetamine use in populations such as gay/bisexual men and adult and juvenile arrestees.

1. GENERAL EPIDEMIOLOGICAL TRENDS IN CALIFORNIA

Several surveys of methamphetamine use indicate that Californians are more likely to have used methamphetamine than residents of other states. The 1991 National Household Survey on Drug Abuse of U.S. citizens aged 12 years and older indicated that 11.7 percent of Californians, or nearly 3,000,000 persons, had used amphetamine (as a general class of drugs, “amphetamine” also refers to methamphetamine) at least once in their life, in comparison with the national prevalence rate of 7.0 percent (Ebener, McCaffrey, & Saner, 1994). Moreover, 2.2 percent of California householders surveyed admitted to amphetamine use in the past year, as compared to 1.3 percent nationally.

Even though nearly 3,000,000 Californians have used amphetamine at some point in their lives, according to the National Household Survey, two features of this data collection method increase the likelihood that the prevalence of use was underestimated. First, the survey excludes specific populations (e.g., homeless, incarcerated) that are known to be at risk for drug use. Furthermore, because of the stigma associated with drug use, research suggests that self-report of illegal use is likely to underrepresent the actual extent of drug use (Hser & Anglin, 1992). Thus, the actual prevalence of past year methamphetamine use and abuse is likely greater than the 2.2 percent estimate from the national survey.

1.1 Hospital Admissions and Emergency Department Visits

A common consequence of drug use is emergency medical treatment. The California Hospital Discharge Data System records about 3,700,000 discharges per year from hospitals throughout the state and represents all hospital admissions that do not terminate in death. Those admissions that are directly or indirectly attributable to methamphetamine can be identified. The Drug Abuse Warning Network (DAWN), funded by the Substance Abuse and Mental Health Services Agency (SAMHSA), collects data on drug-related nonfatal emergency medical episodes in California’s three largest metropolitan areas: San Diego, Los Angeles, and San Francisco.

The Public Statistics Institute (Cunningham & Theilemier, 1995; Cunningham & Theilemier, 1996) has conducted the most comprehensive study of methamphetamine-related admissions (via the emergency department) in the California Hospital Discharge Data System; methamphetamine-related admissions in 1994 (10,167) were 49 percent higher than admissions in 1993 (6,817) and 460 percent higher than admissions in 1985 (1,815). The annual increase in admissions in 1994 (3,350) was the largest ever recorded for an illicit drug in California. Every region in California experienced substantial increases in methamphetamine-related emergency admissions during the study period.

More detailed information on the rates of methamphetamine-related hospital admissions in California for fiscal years 1984 to 1994 are shown in Exhibit II-1 and Exhibit II-2.

EXHIBIT II-1							
PERCENTAGE OF AMPHETAMINE-RELATED EMERGENCY ADMISSIONS BY RACE/ETHNICITY IN CALIFORNIA							
	PERCENT OF ADMISSIONS						PERCENT OF GENERAL POPULATION
GROUP	1984-85	1986-87	1988-89	1990-91	1992-93	1993-94	1990
Whites	81.2	83.9	84.6	82.2	78.4	76.0	57
Latinos	6.6	7.5	7.3	9.2	12.3	14.7	26
African Americans	9.6	6.4	5.6	5.9	6.3	6.1	7
Asian Americans/ Others	2.6	2.2	2.5	2.7	3.0	2.5	9
Total No. of Admissions	3,281	5,635	7,991	6,688	11,869	10,167	

Source: Public Statistics Institute (1995 and 1996).

**EXHIBIT II-2
AMPHETAMINE-RELATED EMERGENCY
ADMISSIONS PER 100,000 PEOPLE IN
CALIFORNIA FROM 1984 TO 1994**

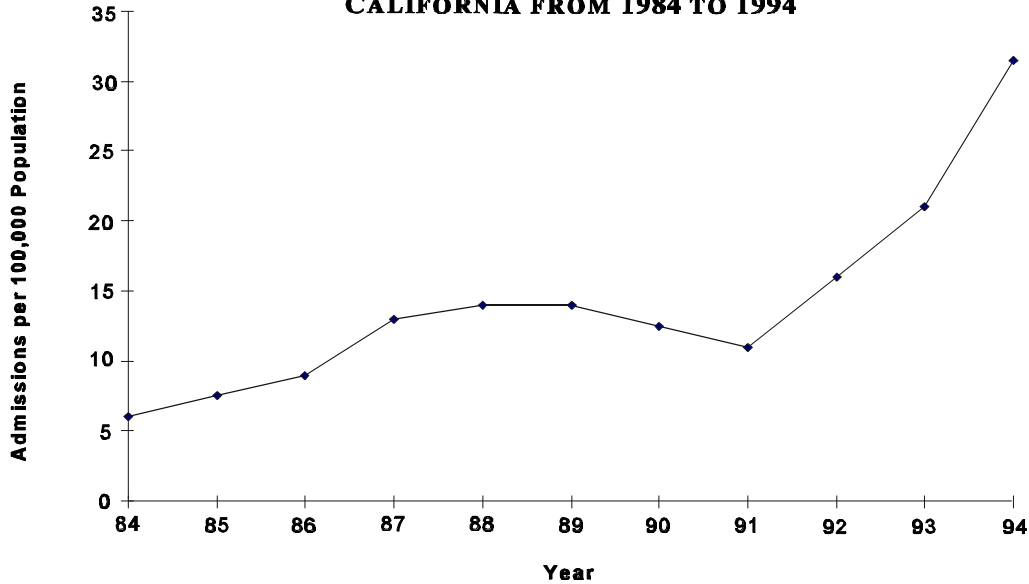


Exhibit II-1 shows that over a series of five 2-year periods, the number of admissions tripled from 1984-85 to 1992-93. The number of admissions in 1994 alone was projected to be 50 percent higher than that for 1992-93, based on the number of admissions for the first 6 months of 1994. Exhibit II-2 reveals a five-fold increase in admissions from 1984 to 1994 when using a ratio statistic that controls for changes in population size (admissions per 100,000 individuals). The data shown in Exhibit II-2 suggest that the absolute numbers presented in Exhibit II-1 may underestimate the severity of the increase in amphetamine-related emergency admissions.

With respect to demographic indices, Exhibit II-1 shows that for each of the fiscal years reported, at least three out of four patients seen in emergency rooms for methamphetamine-related problems were white. It is noteworthy that the percentage of Latino admissions doubled during this interval, indicating that the prevalence of methamphetamine use is increasing across some ethnic groups. Admission rates of African Americans, Asian Americans, and other ethnic groups have remained fairly stable.

The findings from DAWN highlight the upswing in methamphetamine use in some California counties relative to the use of other drugs. Exhibits II-3 and II-4 illustrate either fairly stable or somewhat declining levels of drug-related emergency room incidents, both for absolute numbers and rates per 100,000 of population, in San Diego, Los Angeles, and San Francisco, three of the nation's six Standard Metropolitan Statistical Areas that reported the greatest number of amphetamine-related emergency room incidents from 1988 to 1994.

EXHIBIT II-3
ESTIMATED NUMBER OF DRUG-RELATED EMERGENCY
EPISODES OVER A SIX-YEAR PERIOD IN THE THREE
LARGEST METROPOLITAN AREAS IN CALIFORNIA

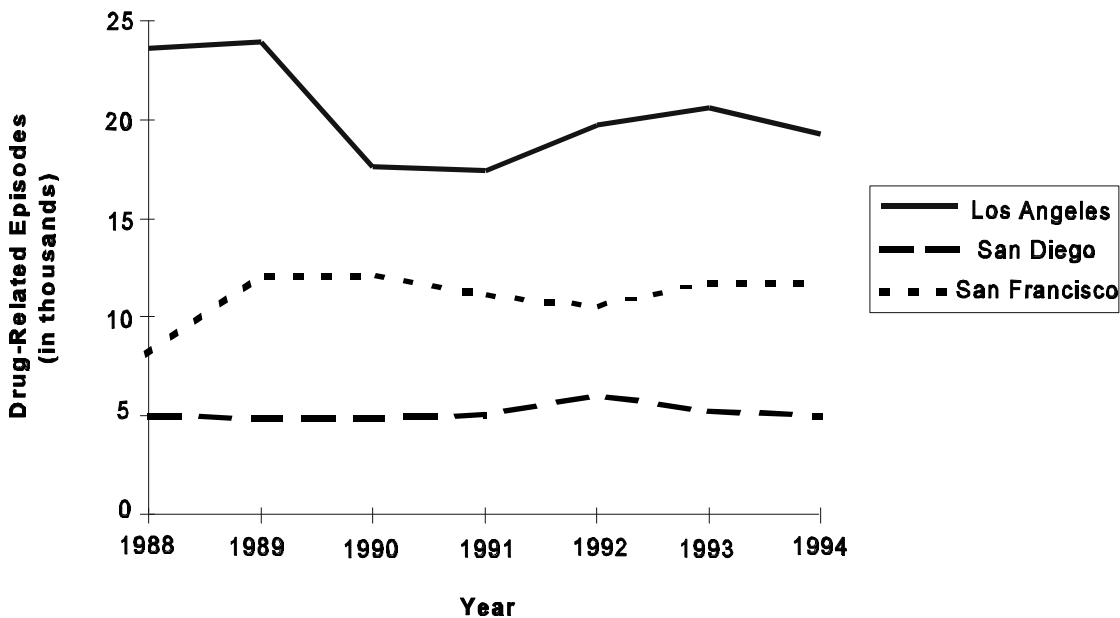


EXHIBIT II-4
ESTIMATED RATE OF DRUG-RELATED EPISODES PER
100,000 PEOPLE OVER A SIX-YEAR PERIOD IN THE THREE
LARGEST METROPOLITAN AREAS IN CALIFORNIA

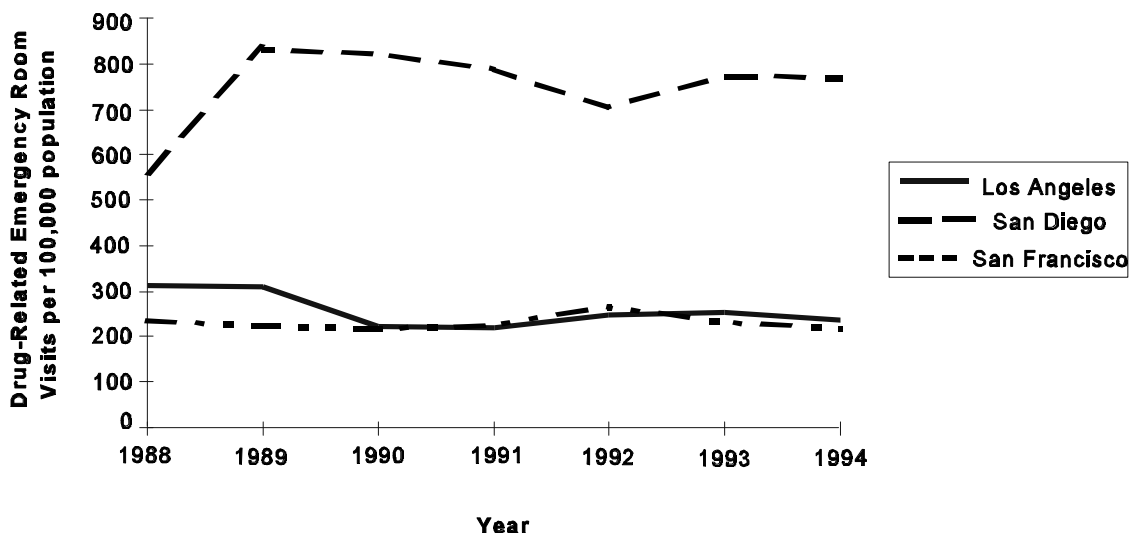
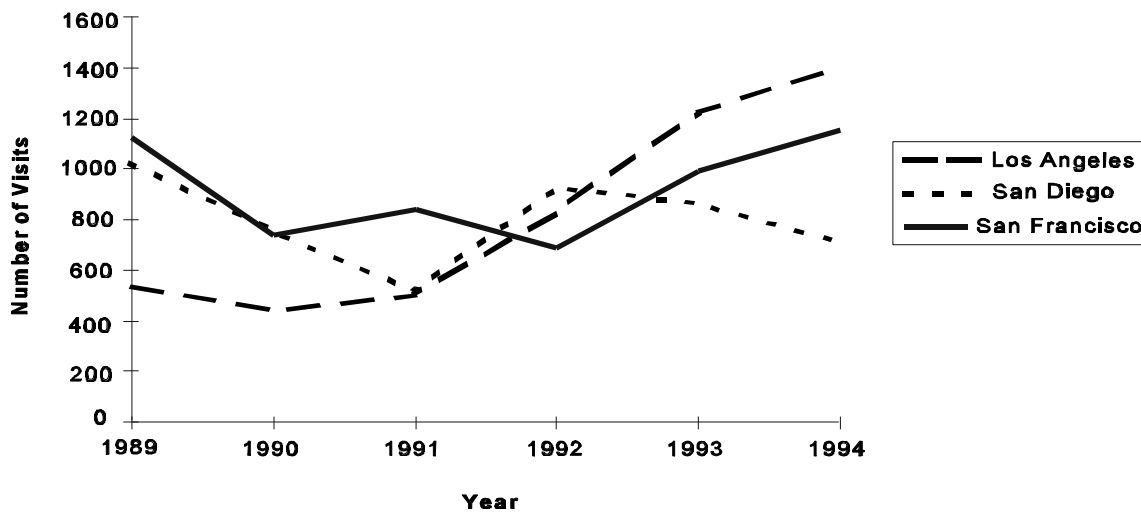


Exhibit II-5, however, shows a general increase in methamphetamine-related emergency room visits in two of these three sites. Specifically, Exhibit II-5 shows a recent marked increase in the number of emergency room visits in Los Angeles; for San Francisco, a slight increase; and for San Diego, a modest reduction.

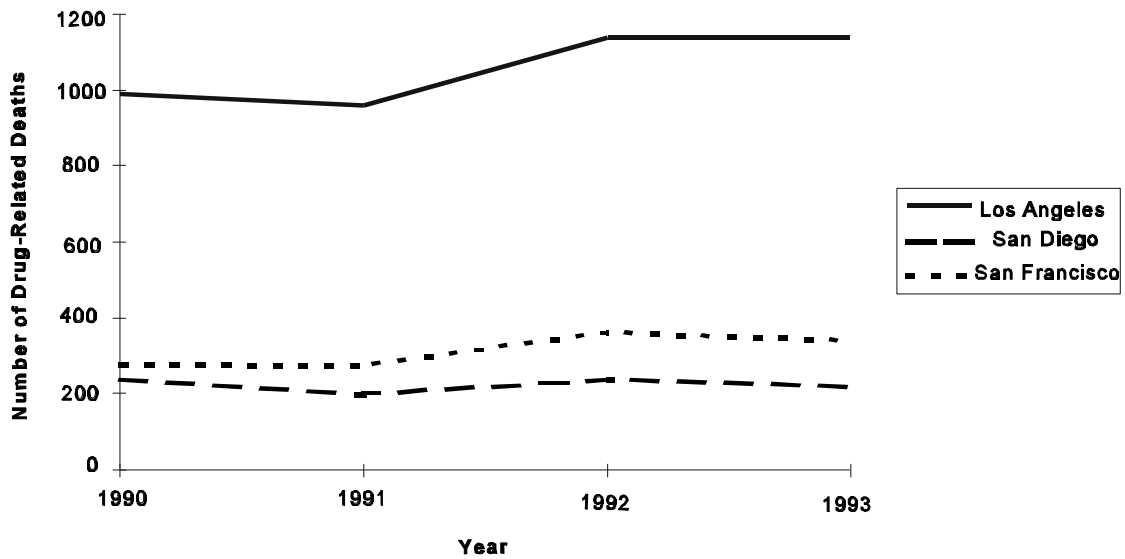
**EXHIBIT II-5
FREQUENCY OF METHAMPHETAMINE-RELATED VISITS
TO EMERGENCY ROOMS ACROSS A FIVE-YEAR
PERIOD FOR THE THREE LARGEST
METROPOLITAN AREAS IN CALIFORNIA**



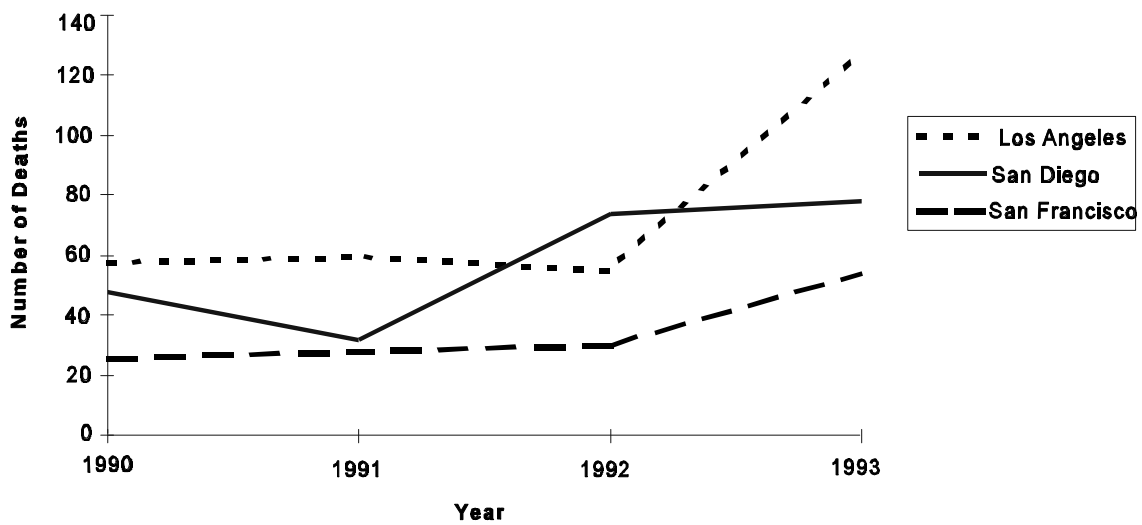
1.2 Medical Examiner Data

DAWN also collects medical examiner data on drug-associated deaths, including suicides, vehicular deaths, and drownings. Exhibit II-6 shows that from 1990 to 1994, total drug-related deaths in Los Angeles, San Francisco, and San Diego have remained relatively stable; however, Exhibit II-7 shows that methamphetamine-related deaths in all three cities have risen markedly. For example, in Los Angeles, methamphetamine-related deaths rose 130 percent from 1993 to 1994. White males comprised 58 percent of the decedents in Los Angeles, 76 percent of the decedents in San Francisco, and 66 percent of the decedents in San Diego.

**EXHIBIT II-6
TOTAL DRUG-RELATED DEATHS IN LOS ANGELES, SAN
DIEGO, AND SAN FRANCISCO FROM 1990 TO 1993**



**EXHIBIT II-7
TOTAL METHAMPHETAMINE-RELATED DEATHS IN LOS
ANGELES, SAN DIEGO, AND SAN FRANCISCO FROM 1990 TO 1993**



1.3 Methamphetamine Seizures

Exhibit II-8 shows the striking escalation of methamphetamine production in California over the past decade. Over the 6-year period from 1984 through 1990, illegal methamphetamine laboratory seizures increased by a factor of four and have remained relatively stable since. Although the number of laboratories seized has remained stable since 1990, the amount of crystal methamphetamine confiscated from 1990 to 1994 increased seven-fold, suggesting that illicit methamphetamine manufacturers have improved the efficiency of their production process.

EXHIBIT II-8 NUMBER AND AMOUNT OF ILLEGAL METHAMPHETAMINE LABORATORIES SEIZED IN CALIFORNIA FROM 1984 THROUGH 1994		
YEAR	NUMBER OF LABS SEIZED	AMOUNT SEIZED
1984	100	N/A
1985	235	N/A
1986	305	N/A
1987	486	N/A
1988	377	N/A
1989	426	N/A
1990	304	1,727 lbs.
1991	352	1,409 lbs.
1992	454	2,580 lbs.
1993	360	5,250 lbs.
1994	396	13,366 lbs.

2. SPECIAL POPULATIONS

In recent years, a number of cohorts in California have been identified as being at a significantly greater level of risk for methamphetamine abuse than the general population. These subgroups include adult and juvenile arrestees, adolescents, and gay/bisexual males. In this section, epidemiological data for these groups are reviewed.

2.1 Adult Arrestees

Data on arrestees are collected nationally by the Drug Use Forecasting Project (DUF), an interview and drug testing program in which arrestees are surveyed shortly after they arrive at local detention facilities. DUF was established by the National Institute of Justice (NIJ) to provide major metropolitan areas with information to be used for the early detection of drug epidemics, allocation of law enforcement resources, determination of prevention and treatment needs, evaluation of initiatives aimed at the reduction of drug abuse and crime, tracking and forecasting of national trends in drug use, and estimation of illicit drug use and abuse across the nation.

In October 1993, the California Department of Alcohol and Drug Programs (ADP) received an Arrestee Needs Assessment contract from the Center for Substance Abuse Treatment (CSAT). As the state subcontractor, the Drug Abuse Research Center (DARC) at UCLA formulated a series of questions to examine the characteristics of the arrestee population in California and the service of their treatment needs. DARC fielded the project between April 1994 and September 1996 in 13 California-based correctional sites for adults and 13 correctional sites for juveniles.

The sample studied in the Arrestee Needs Assessment Project included 2,897 arrestees. Because many of the 2,897 arrestees were from Los Angeles County, only 25 percent of the participants from this area were included in the analyses in order to increase the comparability of the sample sizes across the 13 sites. Ultimately, the sample was comprised of 1,791 participants who provided a urine sample and were from the following 13 counties: Alameda, Contra Costa, Fresno, Kern, Los Angeles, Orange, Riverside, Sacramento, San Bernardino, San Diego, San Mateo, Santa Clara, and Santa Cruz. Demographics of these 1,791 arrestees are presented in Exhibit II-9 which categorizes participants according to the “primary drugs” detected. Urine toxicology screens were used to classify the drug-using subset of DUF arrestees into one of six groups. Because many individuals were polysubstance users, the following hierarchical classification procedure was implemented: (a) participants who tested positive for methamphetamine/amphetamine use were placed into the methamphetamine category, even if drugs other than methamphetamine were present; (b) participants who tested positive for heroin use were placed in the heroin users group unless methamphetamine was present; (c) participants who tested positive for cocaine, including crack use, were placed in the cocaine group; (d) participants who tested positive for both heroin and cocaine were put in a separate group, regardless if other drugs, besides methamphetamine, were detected; (e) participants who tested positive for marijuana use were assigned to the fifth group; and (f) for comparison,

EXHIBIT II-9							
DEMOGRAPHIC CHARACTERISTICS OF 1,791 CALIFORNIA ADULT ARRESTEES BY TYPE OF DRUG DETECTED							
FROM 4/1/94 TO 9/30/96¹							
		DRUGS OF ABUSE					
		Methamphetamine	Heroin	Cocaine/Crack	Heroin and Cocaine	Marijuana	None
VARIABLE	n	(n=463) %	(n=44) %	(n=385) %	(n=74) %	(n=236) %	(n=589) %
Age							
18 - 24	477	19	32	16	11	53	31
25 - 34	721	47	21	43	31	31	40
35+	593	35	48	41	58	16	29
Education							
In high school	28	0	2	1	0	4	2
High school diploma	804	45	34	46	42	43	46
GED	189	13	9	10	22	10	9
No high school degree	770	42	55	44	37	42	43
Gender							
Male	1357	74	77	69	65	85	79
Female	434	26	23	31	35	15	21
Race							
White	609	63	36	14	26	33	25
Latino	610	24	50	27	32	33	46
African American	440	6	7	56	38	25	18
Other	132	7	7	3	4	9	11
Criminal Record							
Ever arrested	1440	90	80	87	97	78	69
Arrested in past year	722	52	43	51	58	38	32
Jailed in past year	707	50	44	43	61	35	29

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

a sixth group was included of adult arrestees for whom no drugs were detected by the urine toxicology screen. Other drugs, such as PCP, benzodiazepenes, barbiturates, methadone, and Quaaludes were present in some arrestees' urine toxicology screens, but these rates were too low to be considered in the analysis. Fewer than 1 percent of the subjects who fell into the methamphetamine group also fell into another group.

The results of analysis of demographic data are also presented in Exhibit II-9. The majority of the participants who used methamphetamine were male, 25 years of age and older, and white. Methamphetamine users did not differ from other drug users with respect to the ratio of male-to-female users. Methamphetamine users were similar to crack/cocaine users regarding their age, but they tended to be older than marijuana users and younger than users of heroin and concurrent users of heroin and cocaine. Ethnically, African Americans and Latinos were much more likely to test positive for heroin, crack/cocaine, heroin and cocaine concurrently, and marijuana than for methamphetamine/amphetamine. Similar to other drug users, methamphetamine users had obtained limited levels of education. Except for individuals using heroin and cocaine concurrently, methamphetamine users were more likely to have been jailed in the past year than users of other drugs. Participants providing a negative urine toxicology screen were similar to the user groups with respect to education and gender, were more likely to be Latino, and were less likely to have a criminal record.

Exhibit II-10 shows more specific data by county on amphetamine and methamphetamine use for the 1,791 arrestees who tested positive for drugs. Arrestees were most likely to have used any type of illegal amphetamine/methamphetamine if they were from the Riverside, San Bernardino, San Diego, Contra Costa, or Orange counties; conversely, arrestees were least likely to have used methamphetamine if they were from Los Angeles or Santa Cruz. Across all counties, legally prescribed amphetamines were least likely to be present.

Notably, arrestees from Contra Costa and San Diego counties almost always tested positive for both illegal amphetamine and methamphetamine; in contrast, arrestees from San Bernardino and Santa Cruz counties used either illegal amphetamine or methamphetamine, but were unlikely to test positive for both. Although the differences across counties in the frequency of positive test results for amphetamine and methamphetamine could be explained by different use patterns for the arrestees in each county, this interpretation is questionable. Rather, it seems more plausible that variability in the production methods of the illicit drugs would account for the differences across counties.

EXHIBIT II-10
FORM IN WHICH AMPHETAMINE/METHAMPHETAMINE WAS USED BY COUNTY
FOR 1,791 ARRESTEES WHO PROVIDED A POSITIVE URINE TOXICOLOGY SCREEN
FROM 4/1/94 AND 9/30/96¹

		TYPE OF STIMULANT			
COUNTY	n	Licit Amphetamine Only %	Illicit Amphetamine %	Methamphetamine %	Any Illegal Amphetamine/ Methamphetamine %
Alameda	162	4	14	3	16
Contra Costa	114	7	36	40	41
Fresno	132	5	17	18	19
Kern	111	4	29	29	30
Los Angeles	309	1	10	9	10
Orange	131	2	30	31	31
Riverside	79	8	42	1	43
Sacramento	123	11	33	40	42
San Bernardino	134	9	31	5	36
San Diego	193	6	33	31	35
San Mateo	114	3	11	12	12
Santa Clara	129	2	13	15	15
Santa Cruz	60	7	8	7	15
Total	1,791	5	23	18	25

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

With respect to demographic characteristics, Exhibit II-11 initially would suggest that white arrestees were most likely to use any type of methamphetamine, that licit forms of the drug were the least likely to be used across age, gender, and ethnicity, and that age and gender of the user were not associated with a predilection toward a particular type of amphetamine/methamphetamine. However, because these findings may be confounded by the aforementioned geographic variation in methamphetamine production, salient differences across these moderating variables may have been masked.

EXHIBIT II-11					
FORM IN WHICH AMPHETAMINE/METHAMPHETAMINE WAS USED BY DEMOGRAPHIC CHARACTERISTICS FOR ARRESTEES WHO PROVIDED A POSITIVE URINE TOXICOLOGY SCREEN FROM 4/1/94 AND 9/30/96¹					
		TYPE OF STIMULANT			
VARIABLE	n	Licit Amphetamine Only %	Illegal Amphetamine %	Methamphetamine %	Any Illegal Amphetamine/ Methamphetamine %
Age					
18 - 24 years old	477	2	17	12	17
25 - 34 years old	721	6	26	21	29
35 years old and greater	593	6	23	20	26
Gender					
Male	1,357	4	22	18	24
Female	434	7	26	19	28
Race					
White	609	8	43	34	46
African American	440	3	5	4	6
Latino	610	4	15	13	18
Other	132	2	22	18	23

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

Exhibits II-12 and II-13 detail the treatment history of the arrestees by type of drug detected. Exhibit II-12 shows that most of the detected users, including the 463 participants identified as methamphetamine users, had not previously received any type of drug treatment. Of the methamphetamine users who had entered substance abuse treatment, almost half had been admitted for alcohol abuse, while only 27 percent had been admitted for amphetamine/methamphetamine abuse.

EXHIBIT II-12							
SELF-REPORTS OF PREVIOUS DRUG TREATMENT FOR 1,791 INDIVIDUALS WHO ENCOUNTERED THE LEGAL SYSTEM FROM 4/1/94 TO 9/30/96¹							
		DRUGS OF ABUSE					
VARIABLE	n	Methamphetamine (n=463) %	Heroin (n=44) %	Cocaine/ Crack (n=385) %	Heroin and Cocaine (n=74) %	Marijuana (n=236) %	None (n=589) %
Previous Types of Treatment:							
None	1,403	77	70	77	54	83	85
Drug	189	11	23	15	34	2	6
Alcohol	63	3	0	3	3	3	6
Drug and Alcohol	136	9	7	5	9	8	3
		n=120	n=15	n=119	n=34	n=40	n=81
Last Treatment for:							
Marijuana	13	1	7	4	0	15	4
Crack/Cocaine	84	13	7	6	18	10	15
Heroin	50	12	67	47	50	5	14
Amphetamine/ Methamphetamine	38	27	7	0	0	10	16
Cocaine/Heroin	2	0	0	0	6	0	0
Alcohol	130	44	6	40	20	55	46
Other	11	2	6	3	6	5	5

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

Exhibit II-13 shows that substance abusers previously admitted for treatment did not show a preference for inpatient or outpatient facilities. Of the arrestees who tested positive for methamphetamine use, 60 percent did not believe that they needed to enter a substance abuse treatment program. This percentage was similar to cocaine and crack users, greater than users of heroin and cocaine concurrently or heroin alone, and less than marijuana users. Interestingly, 15 percent of those arrestees with a negative urine toxicology screen indicated a need for substance abuse treatment.

EXHIBIT II-13							
TYPE OF TREATMENT PREVIOUSLY RECEIVED AND CURRENTLY NEEDED FOR INDIVIDUALS WHO ENCOUNTERED THE LEGAL SYSTEM FROM 4/1/94 TO 9/30/96¹							
		DRUGS OF ABUSE					
VARIABLE	n	Methamphetamine %	Heroin %	Cocaine/Crack %	Cocaine and Heroin %	Marijuana %	None %
Previous Type of Treatment		n=115	n=14	n=118	n=34	n=37	n=81
Inpatient Treatment	115	35	28	48	38	30	49
Community							
Outpatient	16	1	0	5	0	0	2
Methadone	31	6	14	2	12	0	9
Other Outpatient	80	34	14	22	29	43	21
Residential Detox	26	5	15	3	6		5
Residential Long-term	54	9	15	17	9	16	9
Corrections Based	16	9	0	3	6	5	5
12-Step ²	556	37	31	39	46	22	26
Broad Types Treatment Needed		n=463	n=44	n=385	n=74	n=236	n=58
None	1,216	60	48	54	30	80	85
Drug	344	29	32	28	54	11	4
Alcohol	103	4	5	4	3	6	9
Drug and Alcohol	128	7	16	14	14	4	2
In Treatment ²	86	5	5	4	8	3	4

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

² Analyzed separately.

2.2 Adolescent Arrestees

The California Needs Assessment sampled 893 adolescent arrestees in order to delineate the substance abuse patterns in this population. Data were collected from the 13 most populous counties in California. Twelve counties were the same as those sampled for the adult arrestees, but, because so few participants could be sampled in Santa Cruz county, San Francisco county was used instead. Because only 42 participants were identified as methamphetamine users, any conclusions regarding the identifying characteristics of adolescent methamphetamine users are tentative.

Demographic information regarding the adolescent arrestees is shown in Exhibit II-14. Adolescent arrestees were most likely to be male, between the ages of 14 and 19 years old, and marijuana users. Juvenile methamphetamine abusers were likely to be white or Latino, while marijuana users and users of other drugs were likely to be Latino or African American.

EXHIBIT II-14					
DEMOGRAPHIC CHARACTERISTICS OF 620 JUVENILE DRUG ABUSERS WHO ENCOUNTERED THE LEGAL SYSTEM FROM 4/1/94 TO 9/30/96, BY DRUG OF ABUSE					
		DRUG OF ABUSE			
VARIABLE	n	Methamphetamine (n=42) %	Marijuana (n=236) %	Other (n=47) %	None (n=295) %
Age					
11 - 13	32	2	3	2	8
14 - 16	319	52	46	36	54
17 - 19	287	45	51	62	38
Gender					
Male	568	86	93	81	88
Female	70	14	7	19	12
Race					
White	159	36	20	13	28
African American	155	43	34	47	33
Latino	231	7	32	28	21
Other	93	14	14	13	19

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

Exhibit II-15 shows the regional variation in use by county. Adolescent methamphetamine users were most likely to live in Kern, Los Angeles, San Diego, or San Bernardino counties. Adolescent marijuana users were most likely to reside in Alameda, Los Angeles, Riverside, or San Bernardino counties.

EXHIBIT II-15					
PERCENTAGE OF ARRESTS FOR DRUGS OF ABUSE FOR 620 JUVENILE DRUG ABUSERS WHO ENCOUNTERED THE LEGAL SYSTEM FROM 4/1/94 TO 9/30/96¹					
BY 13 CALIFORNIA COUNTIES					
		DRUGS OF ABUSE			
SITE	n	Methamphetamine (n=42) %	Marijuana (n=236) %	Other (n=47) %	None (n=295) %
Alameda	50	0	10	23	5
Contra Costa	31	5	7	6	3
Fresno	45	2	7	11	8
Kern	48	14	5	0	10
Los Angeles	91	12	10	21	18
Orange	50	7	8	11	8
Riverside	50	10	12	2	5
Sacramento	44	5	7	0	9
San Bernardino	49	17	11	4	5
San Diego	43	14	6	4	7
San Francisco	31	0	6	11	4
Santa Mateo	46	5	6	4	10
Santa Clara	42	10	6	2	8

Exhibit II-16 shows that 19 percent of the adolescent arrestees detected with methamphetamine had undergone substance abuse treatment. This rate was slightly greater than that for juvenile arrestees who used marijuana or other drugs.

EXHIBIT II-16					
SELF-REPORTS OF PREVIOUS DRUG TREATMENT FOR 620 JUVENILE OFFENDERS WHO ENCOUNTERED THE LEGAL SYSTEM FROM 4/1/94 TO 9/30/96					
		DRUGS OF ABUSE			
VARIABLE	n	Methamphetamine (n=42) %	Marijuana (n=236) %	Other (n=47) %	None (n=295) %
Previous Types of Treatment					
None	548	81	87	89	91
Drug	32	7	5	4	5
Alcohol	6	0	1	0	1
Drug and Alcohol	34	12	7	6	3
Last Treatment for					
Marijuana	19	7	4	2	2
Crack/Cocaine	1	0	0	0	<1
Heroin	1	2	0	2	0
Amphetamine/ Methamphetamine	8	19	1	0	1
Alcohol	29	7	4	11	4

Exhibit II-17 reveals that if methamphetamine abusers had received treatment, they were most likely to have been placed in an inpatient setting. The ratio of users receiving inpatient treatment versus outpatient treatment was much greater for methamphetamine abusers than for other types of drug abusers; however, this finding should be interpreted conservatively given the relatively small sample size. It is noteworthy that the majority of juvenile arrestee methamphetamine users did not perceive that they needed substance abuse treatment, a finding similar to that for other drug abusers.

EXHIBIT II-17					
TYPE OF TREATMENT RECEIVED PREVIOUSLY AND CURRENTLY NEEDED FOR 620					
JUVENILE OFFENDERS WHO ENCOUNTERED THE LEGAL SYSTEM					
FROM 4/1/94 TO 9/30/96¹					
		DRUGS OF ABUSE			
VARIABLE	n	Methamphetamine (n=42) %	Marijuana (n=236) %	Other (n=47) %	None (n=295) %
Previous Types of Treatment					
None	577	82	92	90	93
Inpatient Treatment	23	12	3	4	3
Outpatient	22	2	5	4	0
Residential Detox	2	2	0	0	3
Corrections Based	6	2	0	2	1
Broad Type of Treatment Currently Needed					
None	528	81	84	74	88
Drug	43	10	8	13	15
Alcohol	13	0	2	4	6
Drug and Alcohol	36	10	6	9	13
In Treatment ²	19	6	3	4	10

¹ All figures in columns pertaining to drug abuse represent within-group percentages.

² Analyzed separately.

2.3 Adolescents in the General Population

Adolescents may represent another emerging at-risk group. The 1993-94 California Student Substance Use Survey (Austin & Horowitz, 1994) showed that 11th graders were twice as likely to have used amphetamine (10%) than cocaine (5%). Austin and Horowitz also compared the self-reported substance use behaviors of 1,243 adolescent dropouts in California to those of 1,673 11th grade students who participated in the 1993-94 California Student Substance Use Survey. Both samples were considered to be representative of their cohort in California, with respect to gender, age, and ethnicity. These data indicated that dropouts were significantly more likely to be involved in the use of alcohol, tobacco, and other drugs than their in-school peers. Dropouts generally reported rates of illicit drug use that were two to four times higher than their in-school counterparts. Three times as many dropouts than 11th graders reported amphetamine/methamphetamine use at least once in the past 6 months (32% versus 10% respectively) and 23 percent of dropouts reported having used amphetamine or methamphetamine in the past month, compared to only 6 percent of 11th graders.

Differences between the two samples were more pronounced with regard to the frequency of methamphetamine use. More than four times as many dropouts as 11th graders reported weekly use (9% versus 2%), and over eight times as many dropouts as 11th graders reported daily use (3.4% versus 0.4%). Unlike the 11th grade students, within the cohort of dropouts, no significant differences were observed between prevalence rates of amphetamine/methamphetamine (32%) and cocaine (28%) use over the previous 6 months.

2.4 Gay and Bisexual Men

Recent studies have documented high levels of methamphetamine use in the Los Angeles gay community. Reback (1996) conducted a study using street outreach techniques with over 6,600 gay drug users and found that crystal methamphetamine was the most frequently used drug in this population and that the majority used the drug as an aphrodisiac. Moreover, 80 percent of the respondents used crystal methamphetamine at least three times per week. An ethnographic study revealed that gay men were introduced to methamphetamine primarily through sexual partners (Eggan, Reback, & Ditman, 1996). While intoxicated on methamphetamine, many of these individuals were more likely to engage in unsafe sex that increased their risk of disease transmission. Male prostitutes often used crystal methamphetamine to increase their energy, and thus have more partners per night. Methamphetamine was accessible through a variety of gay networks, including bars, nightclubs, and sexually oriented telephone 'chat' lines.

3. SUMMARY OF THE EPIDEMIOLOGY OF METHAMPHETAMINE USE

In essence, Californians are more likely to use methamphetamine than residents of other states. This increased likelihood of use is also reflected in greater amounts of methamphetamine being seized and the greater number of methamphetamine production facilities being raided by law enforcement officials. Not surprisingly, amphetamine-related emergency room visits, hospital admissions, and deaths have also risen sharply in recent years.

The demographic profile of methamphetamine users has diversified. In previous years, the overwhelming majority of methamphetamine users were less educated, lower SES whites. Now, in addition to this group, other cohorts of methamphetamine users include Latinos, gay/bisexual males, older adult arrestees (i.e., aged 36 to 45), and adolescents, especially school dropouts.

III. TREATMENT FOR METHAMPHETAMINE USE

As would be expected from the epidemiological data, treatment admissions for methamphetamine abuse/dependence have risen sharply in the 1990s throughout California. The following data sets describe the demographic characteristics of individuals entering treatment for methamphetamine abuse, their legal and psychiatric history, the types of treatments they used, and the relative success of these programs, both in client retention and in post-treatment behavioral improvements.

1. TRENDS IN TREATMENT FOR METHAMPHETAMINE ABUSE

The main purpose of the California Alcohol and Drug Data System (CADDs) is to gather information on clients in state-funded and state-licensed alcohol and drug treatment programs. Treatment programs provide monthly reports on client admissions and discharges to the CADDs database, which then is updated by the California Department of Alcohol and Drug Programs. Through the data collected by CADDs, changes in the trends of treatment admissions associated with methamphetamine use from fiscal year 1990-91 to 1994-95 were examined. The variables available included client demographics, information on pre-admission drug use, discharge status, and treatment duration. It is noteworthy that CADDs collects information only from programs that are publicly funded, and the data set does not include patients who attend private chemical dependence programs. Therefore, these findings should be interpreted conservatively.

CADDs shows that trends noted earlier of increased methamphetamine-related emergency room visits, hospital admissions, and deaths have been paralleled by an increase in the number of admissions to drug treatment facilities. Exhibit III-1 shows that the frequency of methamphetamine-related admissions tripled from fiscal years 1990-91 to 1994-95. Exhibit III-2 presents trends regarding the age, gender, and ethnicity of methamphetamine abusers entering publicly-funded methamphetamine treatment programs from 1990-91 to 1993. Nearly half were likely to be 25 to 34 years of age; one-third were likely to be 24 years old or younger; and about one-fifth were likely to be 35 years of age and older. The proportion of women increased slightly over this period. The majority of clients in publicly-funded treatment programs were white, although the number of Latinos admitted for treatment rose somewhat over the 4-year period. Overall, the absolute number of treatment admissions for methamphetamine rose markedly across all categories of age, gender, and ethnicity.

**EXHIBIT III-1
CADD DATA SHOWING THE FREQUENCY OF
METHAMPHETAMINE-RELATED DRUG
TREATMENT ADMISSIONS IN CALIFORNIA FROM
1990-91 TO 1994-95**

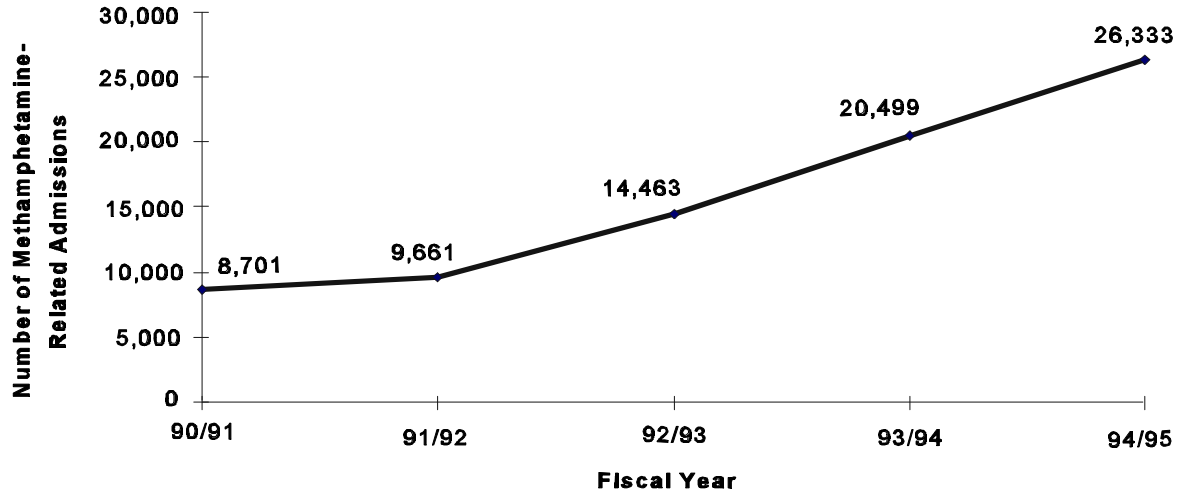


EXHIBIT III-2 CADD DATA: AGE, GENDER, AND ETHNICITY OF INDIVIDUALS SEEKING METHAMPHETAMINE TREATMENT IN CALIFORNIA FOR FISCAL YEARS 1990-91 TO 1993-94								
VARIABLE	1990-91		1991-92		1992-93		1993-94	
	n	%	n	%	n	%	n	%
Age								
18 - 24	3,303	38	3,418	35	4,584	32	6,487	32
25 - 34	4,149	48	4,728	49	7,197	50	10,116	49
35 and older	1,269	22	1,522	16	2,682	18	3,896	19
Gender								
Male	4,759	55	5,144	53	7,509	52	10,241	50
Female	3,941	45	4,517	47	6,954	48	10,258	50
Race								
White	7,282	84	8,015	83	11,648	8	15,910	78
Latino	936	11	1,025	11	1,803	12	3,049	15
African American	218	3	262	3	438	3	544	3
Native American	147	1	158	1	256	2	447	2
Asian American/ Pacific Islander	96	1	161	2	219	2	349	2

2. CHARACTERISTICS OF TREATED METHAMPHETAMINE ABUSERS

To further clarify the most recent patterns of methamphetamine use and characteristics of users admitted to treatment in California, CADDs information collected for fiscal year 1994-95 was analyzed in more detail. In particular, level of abuse by geographic region, seriousness of abuse (i.e., primary, secondary, or tertiary drug problem), other demographics (e.g., age, level of education, gender, occupational status, type of treatment modality), and route of administration were examined.

2.1 Regional Variation

CADDs reveals that methamphetamine abuse is a statewide phenomenon. Exhibit III-3 presents admission data for California's 58 counties, showing the total number of admissions and the percentage of admissions due to methamphetamine. The data show that counties in Southern California, such as Los Angeles, Orange, Riverside, San Bernardino, and San Diego, reported the greatest absolute number of methamphetamine users admitted for treatment; but, in general, methamphetamine abusers comprised a lower percentage of overall admissions for treatment. Conversely, methamphetamine users constituted a larger percentage of treatment admissions in smaller, more rural counties. For example, over 80 percent of the individuals admitted for treatment in Modoc and Trinity counties reported that methamphetamine was their primary drug of abuse. Moreover, the 15 counties with the highest percentage of methamphetamine admissions are relatively rural. Strikingly, in 29 California counties, at least 50 percent of the admissions to drug treatment programs were for methamphetamine abuse/dependence.

Exhibit III-4, which divides California into six regions (Northern California, San Francisco Bay Area, Mid-Coast, Central Valley, Inland, and Southern California Coastal), shows regional variations in the number of methamphetamine abusers admitted to treatment. The greatest absolute number of methamphetamine-related treatment admissions are in the Southern California Coastal region. Although the absolute number of methamphetamine-related admissions in the Inland, Central Valley, and Northern California regions are somewhat lower, they comprise a relatively greater percentage of the total admissions for treatment.

EXHIBIT III-3

PERCENTAGE OF INDIVIDUALS WHO WERE ADMITTED TO DRUG TREATMENT PROGRAMS FROM 7/1/94 TO 6/30/95 WITH METHAMPHETAMINE BEING THE PRIMARY DRUG OF ABUSE (EXCLUDES ALCOHOL PROGRAMS) WITH THE DATA ORDERED FROM HIGHEST TO LOWEST PERCENTAGE OF TOTAL ADMISSIONS BY COUNTY

COUNTY	FREQUENCY	% OF TOTAL ADMISSIONS	COUNTY	FREQUENCY	% OF TOTAL ADMISSIONS
Alpine	1	100.0	San Bernardino	1,555	50.0
Modoc	38	82.6	Plumas	18	48.7
Trinity	22	81.5	Mendocino	169	48.4
Tehama	475	77.9	Merced	266	47.5
Glenn	31	77.5	El Dorado	289	44.9
Shasta	490	68.9	San Diego	3,517	44.7
Lassen	74	64.9	Kings	157	41.1
Yuba/Sutter	123	63.4	Madera	162	40.3
Butte	247	62.4	San Luis Obispo	111	37.6
Placer	306	62.1	Tulare	308	37.6
Tuolumne	93	61.6	Contra Costa	651	37.5
Mono	29	60.4	Orange	1,491	35.4
Calaveras	135	59.0	Santa Clara	1,073	33.6
Stanislaus	532	58.7	Sonoma	296	33.5
Lake	194	58.6	Marin	113	29.4
Sierra	7	58.3	San Benito	12	27.9
Yolo	543	58.2	San Joaquin	205	27.0
Siskiyou	15	57.7	Sacramento	487	26.4
Humboldt	345	56.5	Ventura	365	26.3
Napa	253	56.0	Santa Barbara	304	22.5
Kern	1,308	53.8	Fresno	448	21.3
Inyo	17	53.1	San Mateo	386	20.8
Riverside	1,762	52.5	Santa Cruz	152	18.9
Amador	23	52.3	Monterey	93	15.1
Del Norte	13	52.0	Los Angeles	1,501	12.6
Imperial	257	50.9	Alameda	316	12.4
Solano	454	50.7	San Francisco	387	9.5
Mariposa	26	50.0	Colusa	0	0.0
			Nevada	N/A	N/A

EXHIBIT III-4								
PERCENTAGE OF PEOPLE WHO WERE ADMITTED TO DRUG TREATMENT PROGRAMS FROM 7/1/94 TO 6/30/95 WITH METHAMPHETAMINE BEING THE PRIMARY DRUG OF ABUSE (EXCLUDES ALCOHOL PROGRAMS) WITH THE DATA ORDERED BY GEOGRAPHIC REGION BY COUNTY								
COUNTY	FREQUENCY	%	COUNTY	FREQUENCY	%	COUNTY	FREQUENCY	%
<i>Northern California:</i>			<i>San Francisco Bay Area:</i>			<i>Central Valley:</i>		
Butte	247	62.4	Alameda	316	12.4	Alpine	1	100.0
Colusa	0	0.0	Contra Costa	651	37.5	Amador	23	52.3
Del Norte	13	52.0	Marin	113	29.4	Calaveras	135	59.0
El Dorado	289	44.9	Napa	253	56.0	Fresno	448	21.3
Glenn	31	77.5	San Francisco	387	9.5	Kern	1,308	53.8
Humboldt	345	56.5	San Mateo	386	20.8	Kings	157	41.1
Lake	194	58.6	Santa Clara	1,073	33.6	Madera	162	40.3
Lassen	74	64.9	Solano	454	50.7	Mariposa	26	50.0
Mendocino	169	48.4	Sonoma	296	33.5	Merced	266	47.5
Modoc	38	82.6	<i>Mid Coast:</i>			San Joaquin	205	27.0
Nevada	N/A	N/A	Monterey	93	15.1	Stanislaus	532	58.7
Placer	306	62.1	San Benito	12	27.9	Tulare	308	37.6
Plumas	18	48.7	San Luis Obispo	111	37.6	Tuolumne	93	61.6
Sacramento	487	26.4	Santa Cruz	152	18.9	<i>Inland:</i>		
Shasta	490	68.9	<i>Southern California Coastal:</i>			Imperial	257	50.9
Sierra	7	58.3	Los Angeles	1,501	12.6	Inyo	17	53.1
Siskiyou	15	57.7	Orange	1,491	35.4	Mono	29	60.4
Tehama	475	77.9	San Diego	3,517	44.7	Riverside	1,762	52.5
Trinity	22	81.5	Santa Barbara	304	22.6	San Bernardino	1,555	50.0
Yolo	543	58.2	Ventura	365	26.2			
Yuba/Sutter	123	63.4						

2.2 Level of Use

Exhibit III-5 displays the substances self-reported by patients as being their primary, secondary, and tertiary drugs of abuse when admitted to drug treatment programs in fiscal year 1994-95. Patients enrolled in short-term methadone (detoxification) treatment programs and individuals who indicated that alcohol was their primary drug problem were excluded from the analyses. Overall, 67,814 patients were included in the analyses. For this period, 33.4 percent of admissions reported that methamphetamine was their primary drug problem, a proportion that is greater than that for any other drug, including opiates, cocaine/crack, and marijuana. Fewer than 8 percent of the clients reported that methamphetamine was their secondary or tertiary drug problem. Exclusive of alcohol, across the three classes of drug problems, methamphetamine was most often reported, mentioned in 41.1 percent of admissions.

EXHIBIT III-5								
REPORTED PROBLEM DRUGS FOR TREATMENT ADMISSIONS IN CALIFORNIA, 7/1/94 TO 6/30/95 (EXCLUDES METHADONE DETOXIFICATION PROGRAMS AND PRIMARY ALCOHOL USERS)								
SUBSTANCE OF ABUSE	PATIENT RANK ORDER							
	Primary Drug		Secondary Drug		Tertiary Drug		Combined Mention	
	n	%	n	%	n	%	n	%
Alcohol	N/A	N/A	20,564	30.3	8,499	12.5	29,063	42.8
Methamphetamine	22,644	33.4	3,689	5.4	1,576	2.3	27,909	41.1
Heroin/Opiates	18,101	26.7	1,757	2.6	890	1.3	20,748	30.6
Cocaine/Crack	15,981	23.6	7,939	11.7	2,244	3.3	26,164	38.6
Marijuana	8,487	12.5	10,764	15.9	5,675	8.4	24,926	36.8
Hallucinogens	1,106	1.6	939	1.4	1,051	1.5	3,096	4.5
Other Amphetamine	921	1.4	428	0.6	276	0.4	1,625	2.4
Barbiturates	196	0.3	252	0.4	253	0.4	701	1.1
Tranquilizers	148	0.2	322	0.5	345	0.5	815	1.2
Other	230	0.3	598	0.8	2,646	3.9	3,474	5.0
None	N/A	N/A	20,562	30.3	45,183	66.6	65,745	96.9
Total	67,814	100.0	67,814	100.0	67,814	100.0		

To examine more closely the secondary drug problems of primary methamphetamine users and to assess the relationship of route of administration, analyses reported in Exhibit III-6 show that individuals reporting methamphetamine as their primary drug problem were most likely to report marijuana or alcohol as their secondary drug of abuse. Generally, secondary drug use did not vary with primary route of administration with the exception of abusers by injection, who were more likely to report heroin use and less likely to report marijuana use.

EXHIBIT III-6				
SECONDARY DRUG OF ABUSE FOR PRIMARY METHAMPHETAMINE USERS WHO ENTERED TREATMENT IN CALIFORNIA FROM 7/1/94 TO 6/30/95 AND THE PREFERRED METHOD BY WHICH THEY USE THE DRUG				
REPORTED SECONDARY PROBLEM DRUG	PRIMARY ROUTE OF ADMINISTRATION OF METHAMPHETAMINE WHEN REPORTED AS THE PRIMARY PROBLEM DRUG			
	Oral (n=1,171) %	Smoking (n=4,760) %	Inhalation (n=12,182) %	Injection (n=4,308) %
Alcohol	28.3	25.6	29.2	31.2
Heroin/Opiates	1.7	1.2	0.8	8.9
Cocaine/Crack	5.5	6.9	5.7	8.7
Marijuana	31.5	32.8	33.5	24.9
Other Amphetamines	1.0	0.3	0.3	0.3
Barbiturates	0.3	0.3	0.2	0.4
Other	1.9	2.3	1.9	1.6
None	29.7	30.5	28.4	23.9

2.3 Demographics

Exhibit III-7 displays demographic information on primary, secondary, and tertiary users of methamphetamine admitted to drug treatment in fiscal year 1994-95. Three out of four individuals treated for primary methamphetamine abuse/dependence were white, 50 percent were 25 to 34 years old, and over 80 percent were unemployed or not in the labor force. This pattern was similar for the subgroup of individuals who reported that methamphetamine was their second or third drug problem, although there was a slightly larger percentage of Latinos and African Americans in these cohorts.

EXHIBIT III-7			
DEMOGRAPHIC INDICES OF METHAMPHETAMINE USERS IN CALIFORNIA			
ADMITTED TO DRUG TREATMENT PROGRAMS FROM 7/1/94 TO 6/30/95			
(EXCLUDES REPORTED ALCOHOL-ONLY)			
VARIABLE	METHAMPHETAMINE MENTIONED AS:		
	Primary Drug%	Secondary Drug%	Tertiary Drug%
Age Group			
<18	6.7	8.6	13.6
18 - 24	24.0	17.0	14.1
25 - 34	51.5	46.9	40.9
35 - 44	15.8	23.0	25.8
45+	2.0	4.5	5.6
Gender			
Male	50.5	61.0	63.4
Female	49.5	39.0	36.6
Race			
White	76.5	73.6	66.0
Latino	16.4	18.3	22.8
African American	2.8	4.3	8.1
Asian American	2.1	1.4	1.0
Native American	2.1	2.3	2.1
Employment Status			
Employed full-time	9.2	9.2	9.4
Employed part-time	6.8	6.3	7.1
Unemployed	25.0	25.3	21.7
Not in labor force	59.0	59.2	61.7

Exhibit III-8 describes the types of treatment modalities utilized by 27,909 individuals reporting methamphetamine as their primary, secondary, or tertiary drug of abuse. Most primary users enrolled in either residential (26.5%) or outpatient drug-free (51.5%) programs. Relatively few enrolled in day treatment or hospital-based programs. A similar pattern was obtained for secondary and tertiary methamphetamine users.

With regard to the length of stay in treatment, Exhibit III-8 shows that on average, clients whose primary drug problem was methamphetamine stayed in outpatient drug-free programs for 78.2 days; for day treatment clients, 77.5 days; for residential rehabilitation programs, 53.2 days; and for inpatient hospital programs, 10.5 days. Retention in specific types of treatment is comparable for drug abusers reporting methamphetamine as their secondary or tertiary drug problem.

EXHIBIT III-8 TYPE OF TREATMENT AND LENGTH OF STAY IN TREATMENT FOR 27,909 INDIVIDUALS REPORTING METHAMPHETAMINE AS THEIR PRIMARY, SECONDARY, OR TERTIARY DRUG OF ABUSE				
VARIABLE	TREATMENT MODALITY	PRIMARY DRUG%	SECONDARY DRUG%	TERTIARY DRUG%
Type of Treatment	Hospital	0.3	0.3	0.4
	Residential Detox	9.5	20.0	12.6
	Residential Non-Detox	26.5	25.1	23.5
	Outpatient Drug Free	51.5	36.0	38.5
	Other Outpatient (Non-methadone)	2.8	2.0	1.8
	Day Treatment	9.1	5.3	5.0
	Methadone Maintenance	N/A	1.5	2.6
	Methadone Detox	N/A	9.4	15.1
Mean Length of Treatment (in days)	Hospital	10.5	6.6	11.0
	Residential Detox	6.2	4.9	4.5
	Residential Non-Detox	53.2	56.3	55.5
	Outpatient Drug Free	78.2	79.3	84.3
	Other Outpatient (Non-methadone)	88.8	89.4	81.6
	Day Treatment	77.5	74.8	76.2
	Methadone Maintenance	N/A	90.5	120.6
	Methadone Detox	N/A	14.6	15.7

Exhibit III-9 compares characteristics of patients who used only methamphetamine and those who used methamphetamine together with other drugs to opiate, cocaine/crack, and polydrug users. CADDIS data included 146,072 subjects who utilized treatment in fiscal year 1994-95. As anticipated, three out of four clients who used methamphetamine only or who used methamphetamine along with other drugs were white. In comparison, fewer than one-half of the clients who received treatment for the abuse of opiates, cocaine/crack and heroin, or cocaine/crack alone were white. Few African Americans (2.7%) used methamphetamine, although they comprise about 10 percent of the total California population. In contrast, they represented a majority of the treatment admissions who used only crack or cocaine. Across all drug types, relatively few Asian Americans were enrolled in drug treatment programs when considering that they comprise approximately 10 percent of the total California population. Women represented over one-half of the clients using methamphetamine only and nearly one-half of those who used methamphetamine along with at least one other drug or crack/cocaine. Far fewer women reported use of opiates only.

Exhibit III-9 also reveals that 26.5 percent of methamphetamine users admitted for treatment were 24 years of age or younger, and 20 percent were at least 36 years of age. This finding may signal a trend toward the abuse of this drug across the age spectrum. One cohort may include older adults whose abuse may be long-standing or chronic abusers of other drugs who currently abuse methamphetamine because it is cheap and easy to obtain. Another may include younger users who appreciate the drug's potency, have developed dependence, and/or can obtain the drug cheaply and with relative ease.

Finally, Exhibit III-9 shows the type of treatment program selected by drug(s) of abuse. As previously discussed, methamphetamine users are enrolled primarily in outpatient drug-free and residential (non-detoxification) treatment programs. This pattern is similar to that of other drug users with the exception of opiate addicts, who tend to enter methadone programs.

EXHIBIT III-9						
CHARACTERISTICS OF INDIVIDUALS WHO ENTERED DRUG TREATMENT CLINICS AND THE TYPE OF SUBSTANCE ABUSE TREATMENT SELECTED, BY THE TYPES OF DRUG(S) ABUSED (7/1/94 AND 6/30/95)						
VARIABLE	METHAMPHETAMINE ALONE (n=6,276) %	OPIATES ONLY (n=41,400) %	COCAINE/ CRACK ONLY (n=4,510) %	METHAMPHETAMINE AND OTHER DRUGS (n=24,863) %	COCAINE AND HEROIN (n=21,959) %	OTHER POLYDRUG ABUSE (n=47,064) %
Age Group						
< 18 years old	2.8	0.1	0.8	8.3	0.2	9.5
18 - 24 years old	23.7	4.4	12.2	21.6	4.6	11.9
25 - 35 years old	53.5	31.8	52.9	49.4	34.8	40.7
36 - 45 years old	17.8	44.8	28.6	17.9	44.0	29.5
> 46 years old	2.2	18.9	5.5	2.8	16.3	8.4
Female	52.0	31.6	45.0	45.1	37.6	36.0
Race/Ethnicity						
White	76.7	47.1	18.9	75.4	40.9	48.2
Latino	16.3	37.2	16.1	17.1	34.2	24.2
African American	2.7	12.3	62.1	3.4	22.3	24.7
Asian American	2.7	2.4	2.4	1.7	1.5	1.4
Native American	1.6	0.9	0.5	2.3	1.0	1.5
Treatment Modality						
Hospital	0.6	1.1	1.9	0.2	2.0	1.1
Residential Detox	12.0	2.1	10.1	12.6	2.7	14.9
Residential Non-Detox	21.0	1.4	30.2	27.3	6.7	21.4
Outpatient Drug Free	54.7	2.7	44.1	45.3	5.9	38.5
Methadone Maintenance	N/A	8.8	N/A	0.5	8.7	2.1
Methadone Detox	N/A	82.5	N/A	3.3	71.3	13.4
Other Outpatient	3.0	0.4	2.9	2.4	0.8	2.2
Day Treatment	8.7	0.4	10.5	7.9	1.3	5.8

Exhibit III-10 shows mean length of treatment retention (in days) for individuals who entered drug treatment programs, again arrayed by drug(s) of abuse. Although not statistically or clinically significant, methamphetamine abusers stayed in treatment somewhat longer than opiate abusers, but did not stay longer than other drug users. Across five of six modalities (excluding methadone-based treatments), users of methamphetamine and other drugs have slightly longer retention than users of methamphetamine only. Generally, users of methamphetamine are similar to users of other drugs with regard to treatment retention.

2.4 Route of Administration

CADDS also collected information regarding the route of administration of methamphetamine for 3 fiscal years: 1992-93 to 1994-95. Exhibit III-11 shows that during this 3-year period, over 50 percent of the methamphetamine users inhaled the drug, injection use decreased slightly, and smoking as the route of administration increased modestly. Given the increases in numbers of methamphetamine-related treatment admissions over this same period (see Exhibit III-1), apparently most emerging users either inhale or smoke the drug. Exhibit III-12 shows that older age was associated with use by injection. Females were more likely to inhale methamphetamine or take it in pill form rather than inject or smoke the drug. White users showed a modest tendency to inject methamphetamine and African-American users were more likely to smoke methamphetamine. Exhibit III-13 reveals that when examining route of administration for four geographical areas in California for fiscal year 1994-95, abusers from San Francisco were much more likely to inject methamphetamine; in contrast, individuals from Los Angeles, Riverside, and San Diego were much more likely to inhale or smoke methamphetamine.

Exhibit III-14 details the results of a logistic regression that identified the characteristics of those most likely to inject methamphetamine in a sample of 22,645 methamphetamine users entering treatment from 7/1/94 to 6/30/95. Individuals who primarily injected methamphetamine were more likely to be male, over the age of 25, also a heroin user, and a resident of an urban area. Latino methamphetamine users were less likely, overall, to inject the drug.

EXHIBIT III-10
MEAN LENGTH OF TREATMENT (IN DAYS) BY DRUG(S) OF ABUSE FOR INDIVIDUALS
WHO ENTERED DRUG TREATMENT CLINICS FROM 7/1/94 TO 6/30/95

TREATMENT MODALITY	METHAMPHETAMINE ALONE (n=6,276) %	OPIATES ALONE (n=41,400) %	COCAINE/ CRACK ALONE (n=4,510) %	METHAMPHETAMINE AND OTHER DRUGS (n=24,863) %	COCAINE AND HEROIN (n=21,959) %	OTHER POLYDRUG ABUSE (n=47,064) %
Hospital	6.3	7.6	9.6	10.9	8.7	8.9
Residential Detox	6.3	5.5	5.8	5.5	4.8	4.7
Residential Non-Detox	49.6	50.6	57.4	54.8	60.9	58.1
Outpatient Drug Free	54.7	62.9	77.3	78.8	70.6	84.1
Methadone Maintenance	N/A	103.2	N/A	90.5	97.9	106.4
Methadone Detox	N/A	4.4	N/A	14.6	13.5	15.3
Other Outpatient	85.8	56.4	91.1	90.0	72.6	84.5
Day Treatment	72.4	54.6	57.5	78.6	62.4	74.6

EXHIBIT III-11
PRIMARY ROUTE OF ADMINISTRATION FOR
METHAMPHETAMINE USERS IN THE STATE OF
CALIFORNIA FOR FISCAL YEARS 1992/93 TO 1994/95

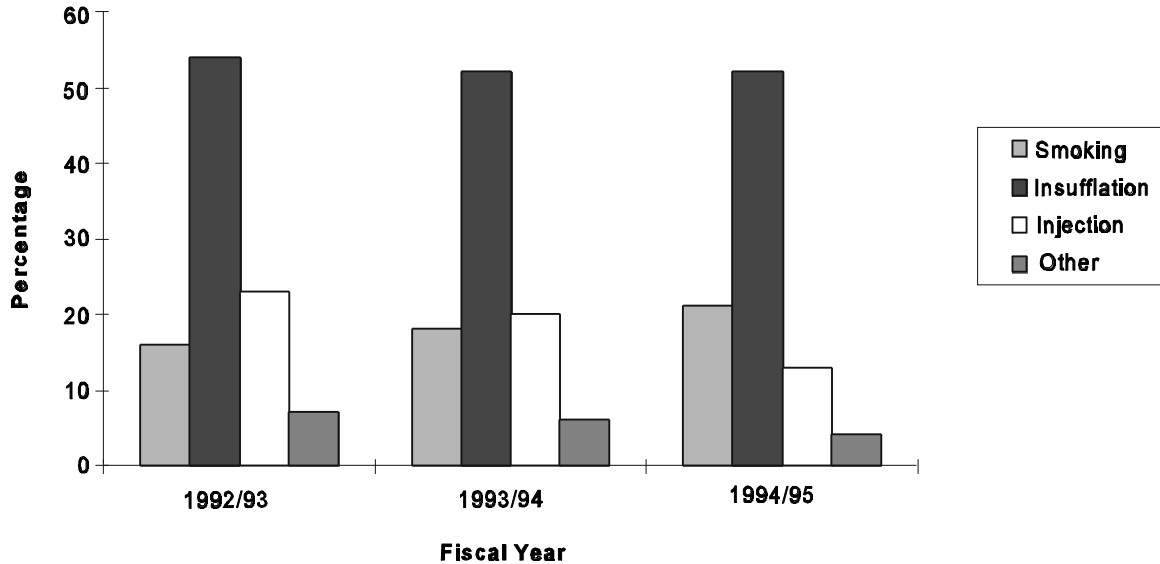
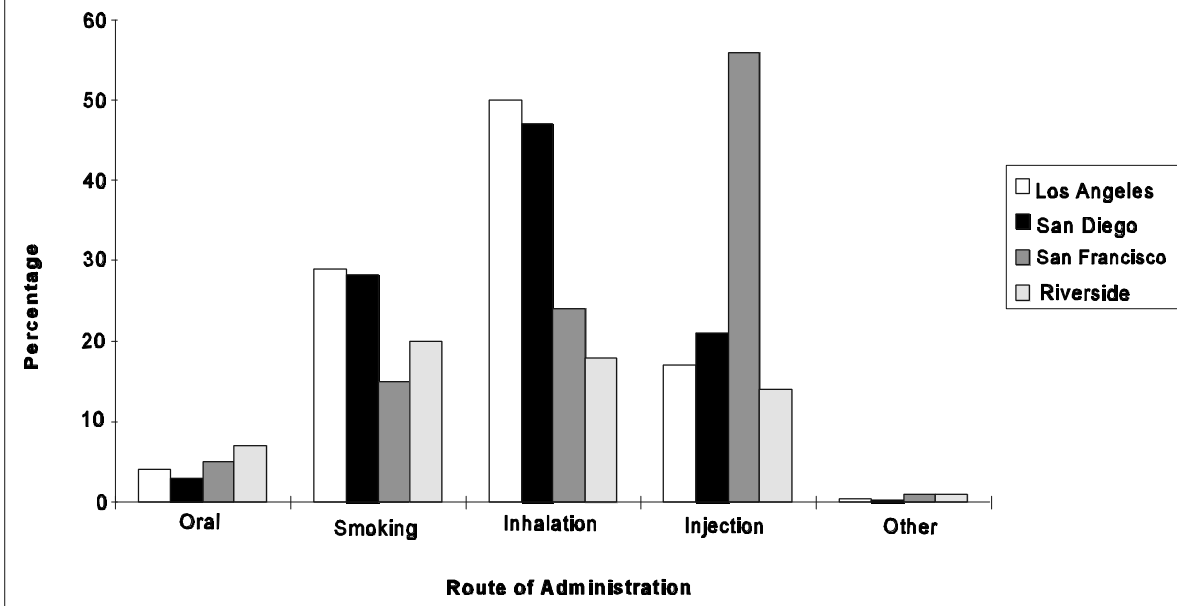


EXHIBIT III-12
DEMOGRAPHIC CHARACTERISTICS ACCORDING TO PRIMARY ROUTE OF
ADMINISTRATION AMONG METHAMPHETAMINE USERS WHO ENTERED TREATMENT IN
CALIFORNIA FROM 7/1/94 TO 6/30/95

VARIABLE	PRIMARY ROUTE OF ADMINISTRATION				
	Oral (n=1,171) %	Smoking (n=4,760) %	Inhalation (n=12,182) %	Injection (n=4,308) %	Total (n=22,569) %
Age					
< 18	6.5	7.1	8.4	1.0	6.7
18 - 24	20.3	27.3	26.0	15.7	24.0
25 - 35	47.5	52.7	49.0	58.7	51.5
36 - 45	21.3	12.0	14.7	21.9	15.8
46 +	4.4	1.0	1.8	2.7	2.0
Race					
White	77.5	70.3	75.8	85.0	76.5
Latino	16.9	19.1	18.6	7.1	16.4
African American	1.7	4.9	1.9	3.1	2.8
Asian American/Pacific Islander	2.5	2.1	1.8	3.1	2.1
Native American	1.4	3.6	1.8	1.7	2.1
Female	54.9	43.7	52.8	44.8	49.5

**EXHIBIT III-13
PRIMARY ROUTE OF METHAMPHETAMINE ADMINISTRATION BY
LOS ANGELES, SAN DIEGO, SAN FRANCISCO, AND RIVERSIDE
COUNTIES FOR USERS WHO ENTERED A DRUG TREATMENT
PROGRAM IN CALIFORNIA DURING THE FISCAL YEAR 1994/95**



**EXHIBIT III-14
PREDICTORS OF INJECTION USE IN 22,645 METHAMPHETAMINE USERS WHO
ENTERED TREATMENT IN CALIFORNIA FROM 7/1/94 TO 6/30/95**

VARIABLE	b	ODDS RATIO	95% CONFIDENCE INTERVAL
Sex:			
Female		1	
Male	.2341*	1.264	1.179 - 1.355
Race/Ethnicity:			
Whites		1	
Latino	-1.0220*	.360	.317 - .408
African-American	-.1691	.844	.688 - 1.058
Other	-.0043	.996	.844 - 1.175
Age:			
< 25		1	
25 - 39	.8401*	2.317	2.119 - 2.533
40 +	1.0382*	2.824	2.475 - 3.222
Heroin Use:			
No		1	
Yes	2.4320*	11.38	9.325 - 13.892
Resident of Urban Area:			
No		1	
Yes	.2589*	1.296	1.199 - 1.399

*p ≤ .05.

3. SUMMARY OF FINDINGS FROM CADDS

The marked increase in methamphetamine manufacture and abuse indicated by the epidemiological data has been paralleled by an increase in the number of admissions to publicly-funded treatment centers in California. In fact, methamphetamine use was the primary drug problem among treatment admissions in California overall and markedly so in over 50 percent of the state's counties. This rise in admissions occurred across all ethnicities, especially for Latino methamphetamine abusers, and was not confined to any particular region in the state.

Individuals who entered treatment were likely to be 25 to 34 years of age, white, and unemployed. Age and gender were not associated with route of administration; in contrast, with respect to geography, San Franciscans and/or heroin users were more likely to inject the drug while Angelenos, San Diegans, and Latinos were more likely to smoke or inhale methamphetamine.

Methamphetamine users who entered treatment were likely to utilize residential or outpatient programs rather than day-treatment or hospital programs. In all modalities, they were retained in treatment for a slightly shorter period of time than all other types of drug users, except for opiate users.

IV. EFFECTIVENESS OF TREATMENT FOR METHAMPHETAMINE ABUSE

This section of the report focuses on issues related to the treatment of methamphetamine abuse, such as the characteristics of incoming clients, changes in these characteristics over time, and treatment utilization and outcome. These issues are examined through the secondary analysis of available state data, collected in the course of the California Drug and Alcohol Treatment Assessment (CALDATA) and Target Cities Treatment Enhancement Program (TCTEP) studies. Both studies were formulated to assess the effectiveness of substance abuse treatment programs in California.

1. CALIFORNIA DRUG AND ALCOHOL TREATMENT ASSESSMENT

The California Drug and Alcohol Treatment Assessment (CALDATA) was funded by the State of California, Alcohol and Drug Programs (ADP) and was conducted by the National Opinion Research Center (NORC). The California Alcohol and Drug Data System (CADDSS) database provided the sampling frame for programs selected for study. During 1991 and 1992, NORC sampled participants in four major types of publicly-funded drug treatment programs. The purpose of the study was to assess the effectiveness of the drug treatment system in California. Although CALDATA evaluated alcohol treatment programs, that data were not included in these analyses.

Because many individuals were polysubstance abusers, a taxonomy identical to that employed in the analysis of the California Drug Use Forecasting (CALDUF) was employed such that the 1,444 qualifying CALDATA participants were classified according to their self-reports regarding the drug that they primarily abused: (a) participants who reported methamphetamine/amphetamine use were placed into the methamphetamine category, even if drug use other than methamphetamine were reported; (b) participants who reported heroin use were placed in the heroin users group, unless methamphetamine/amphetamine abuse was reported; (c) participants who reported cocaine or crack use were placed in the cocaine group; (d) participants who reported both heroin and cocaine use were placed in a separate group, regardless if other drugs besides methamphetamine were reported; and (e) participants who reported only marijuana use were assigned to the fifth group. Other drugs, such as PCP, benzodiazepenes, barbiturates, methadone, and Quaaludes, were reported at rates that were too low to be considered in the analysis.

Exhibit IV-1 shows that the methamphetamine abusers who entered treatment tended to be male, at least 25 years of age, modestly educated (i.e., a high school diploma or a GED), white or Latino, and unemployed at the time of admission. Compared to other user groups, with the exception of marijuana users, methamphetamine users were more likely to be 24 years of age or younger. Similar to other drug users, methamphetamine users tended to be male, modestly educated, and unemployed at the time of admission. Methamphetamine users, like concurrent users of heroin and cocaine or heroin alone, tended to be white or Latino. Crack/cocaine users were primarily African American. Marijuana users tended to be white.

EXHIBIT IV-1						
CALDATA: DEMOGRAPHIC CHARACTERISTICS OF 1,440 PROGRAM ADMISSIONS BY PRIMARY DRUG USED						
		DRUGS OF ABUSE				
VARIABLE	n	Methamphetamine (n=235) %	Heroin (n=607) %	Crack/Cocaine (n=364) %	Heroin and Cocaine (n=166) %	Marijuana (n=68) %
Age:						
18 - 24	123	24	2	8	2	29
25 - 34	510	43	27	48	28	36
35 +	792	30	71	43	70	25
Education:						
High school diploma	628	35	40	57	43	37
GED	272	23	21	13	23	15
No high school degree	536	43	39	30	36	47
Gender:						
Male	912	60	63	65	62	71
Female	532	40	37	35	38	29
Race:						
White	646	74	44	30	41	43
Latino	420	17	42	11	39	34
African American	290	3	8	55	14	15
Other	88	6	6	5	6	9
History of Full-time Employment:						
Ever	1,219	80	87	84	89	70
Time of entry into tx	166	20	24	21	24	22

Exhibit IV-2 shows data regarding participants' criminal, needle-using, treatment, and psychiatric histories. Prior to their admission for treatment, most methamphetamine users had been arrested at least once in their lifetime, and about two out of five had been incarcerated in the 12 months preceding their entrance to the program. Over one-third were likely to have used a needle at least once in their lifetime. One in three were likely to have previously undergone substance abuse treatment. Of those that entered treatment, half enrolled in an outpatient program, one-third in an inpatient program, and one-fifth in a residential program. Fourteen percent of individuals using methamphetamine on admission reported a history of psychiatric illness.

EXHIBIT IV-2						
CALDATA: DEMOGRAPHIC CHARACTERISTICS OF 1,440 PROGRAM ADMISSIONS BY PRIMARY DRUG USED						
		DRUGS OF ABUSE				
VARIABLE	n	Methamphetamine (n=235) %	Heroin (n=607) %	Crack/Cocaine (n=364) %	Heroin and Cocaine (n=166) %	Marijuana (n=68) %
Criminal Measures						
Ever Arrested	1,208	80	88	79	93	64
Incarcerated in past year	501	39	33	36	37	25
Needle Use at Least Once	825	37	93	14	93	8
Previously Treated for Substance Abuse	675	36	56	45	64	24
Type of Prior Treatment						
Inpatient	128	32	11	37	15	25
Residential	92	21	8	28	11	13
Outpatient	168	48	14	34	16	62
Methadone	263	0	68	1	59	0
History of Psychiatric Illness	170	14	12	10	13	9

Overall, methamphetamine abusers were less likely to use by injection than individuals using cocaine and heroin concurrently or heroin alone, but more likely to use by injection than crack and cocaine abusers. Methamphetamine users were just as likely as other drug users to have been incarcerated in the year prior to admission and to have been treated for a psychiatric disturbance. Methamphetamine users were less likely to have a history of substance abuse treatment than all other drug abusers, except those who used marijuana. Similar to abusers of other drugs, except those abusing heroin and cocaine concurrently or heroin alone, methamphetamine abusers were equally likely to utilize inpatient or outpatient treatment.

Exhibit IV-3 shows that methamphetamine abusers, similar to abusers of other drugs, frequently entered treatment due to pressure from significant others to discontinue their drug use and for issues regarding custody of children; however, methamphetamine users were more likely to have entered treatment because of pressure from the criminal justice system. The availability and cost of methamphetamine and occupational difficulties did not seem to provide the impetus for methamphetamine abusers to enter treatment. The majority of substance abusers reported broadly that personal reasons prompted their entry into treatment, indicating that many participants may have been reluctant to discuss the issues or events that led them to enter a substance abuse treatment program.

Exhibits IV-4 and IV-5 show that methamphetamine abusers were most likely to utilize the following services: individual and group counseling, activity groups, educational courses, and 12-step programs. They were least likely to utilize detoxification programs, case management, and sober living environments. Methamphetamine abusers had the greatest difficulty completing the following programs: individual and group counseling, 12-step programs, and drug education counseling. In general, these findings were similar to those of individuals who were treated for other types of drug abuse.

EXHIBIT IV-3						
CALDATA: REASONS PROMPTING 1,440 DRUG USERS TO ENTER TREATMENT						
		DRUGS OF ABUSE				
VARIABLE	n	Methamphetamine (n=235) %	Heroin (n=606) %	Crack/Cocaine (n=364) %	Heroin and Cocaine (n=166) %	Marijuana (n=68) %
Difficult to Obtain Drug	54	2	5	2	6	0
Prohibitive Cost of Drug	197	5	21	8	15	1
Pressure from Criminal System	290	41	10	23	15	35
Pressure from Relationship	327	19	25	20	26	19
Keep Job	103	5	8	7	8	6
Maintain Child Custody/Improve Parenting Skills	259	19	17	18	25	7
Health Reasons	226	12	16	14	24	12
Personal Reasons	1,148	64	85	82	81	62

EXHIBIT IV-4

CALDATA: DETAILING THE TYPE OF COUNSELING PROCEDURE RECEIVED BY 1,440 DRUG USERS AND THE RATE OF SUCCESSFUL COMPLETION FOR EACH MODALITY

		DRUGS OF ABUSE				
VARIABLE	n	Methamphetamine (n=235) %	Heroin (n=607) %	Crack/Cocaine (n=364) %	Heroin and Cocaine (n=166) %	Marijuana (n=68) %
Individual Counseling:	1,276					
None		4	1	5	1	3
Completed		64	53	55	46	63
Incomplete		32	45	39	53	33
Group Counseling:	1,036					
None		11	67	7	53	13
Completed		61	19	56	26	58
Incomplete		28	14	36	21	29
Family Counseling:	774					
None		47	83	57	87	41
Completed		39	11	25	9	30
Incomplete		14	6	18	4	29
Drug Education:	979					
None		10	27	8	17	18
Completed		69	44	57	38	59
Incomplete		21	29	35	44	23

EXHIBIT IV-5						
CALDATA: DETAILING THE TYPE OF COUNSELING PROCEDURE RECEIVED BY 1,440 DRUG USERS AND THE RATE OF SUCCESSFUL COMPLETION FOR EACH MODALITY						
		DRUGS OF ABUSE				
VARIABLE	n	Methamphetamine (n=235) %	Heroin (n=607) %	Crack/Cocaine (n=364) %	Heroin and Cocaine (n=166) %	Marijuana (n=68) %
12-Step Program:	855					
None		14	76	11	63	18
Completed		65	16	56	23	59
Incomplete		21	8	33	14	23
Day Treatment:	741					
None		86	85	79	92	88
Completed		4	7	9	4	4
Incomplete		11	7	13	4	8
Case Management:	743					
None		72	80	57	83	74
Completed		18	15	23	12	11
Incomplete		10	5	20	5	15
Sober Living:	810					
None		68	90	59	86	76
Completed		19	4	26	6	15
Incomplete		12	5	15	8	9

Exhibit IV-6 shows that, across the five classifications of treatment admissions, methamphetamine users were more likely to complete treatment than heroin users and individuals who concurrently used heroin and cocaine, and were slightly less likely to complete treatment than individuals treated for crack/cocaine or marijuana use. The greatest difficulties associated with program completion were that treatment was unsuccessful, that they were dropped from the program, or that there were logistical problems. Cost of the treatment was not an overriding issue for methamphetamine users but was a significant issue for heroin users and individuals who concurrently used heroin and cocaine.

CALDATA also examined the relapse behavior of 1,311 treatment admissions in the 12 months post-treatment. One set of questions asked participants to report those drugs that they had used at least five times in the past year since they completed treatment. When examining the ratio of use of a particular drug after treatment to use of that same drug before treatment, Exhibit IV-7 revealed that over 60 percent (53/90) of primary methamphetamine abusers had used methamphetamine more than five times in the year subsequent to treatment. This finding is similar to that of users of heroin and cocaine concurrently, and crack abusers (55% relapse rate), lower than marijuana (71%) and heroin abusers (80%), and higher than cocaine abusers (37%). Although relapse generally occurred with less frequency for other drugs of abuse, these data suggest higher overall rates of relapse when considering rates of use for all drugs subsequent to treatment.

Exhibit IV-8 shows that after formal treatment discharge, methamphetamine abusers were more likely to attend 12-step programs than all other drug users, with the exception of individuals who were treated for crack or cocaine abuse. They were equally likely to have a job or to have been arrested and booked for criminal activity, to have seen a mental health worker, and to have considered and attempted suicide.

2. SUMMARY OF CALDATA

The data collected in this statewide evaluation of drug treatment outcomes show that the participants were demographically similar to those samples from the previously reported sources of drug use data in California (CALDUF and CADDs). Compared to abusers of other drugs, (except those who abuse marijuana), methamphetamine abusers showed a wider distribution with respect to age. Methamphetamine abusers were similar to other drug users with respect to level of education, ratio of male to female users, legal history, and history of psychiatric illness. Ethnically, methamphetamine abusers tended to be white and Latino, which is similar to the

EXHIBIT IV-6						
CALDATA: REASONS WHY 1,268 INDIVIDUALS ENDED PUBLICLY-FUNDED TREATMENT						
		DRUGS OF ABUSE				
VARIABLE	n	Methamphetamine (n=235) %	Heroin (n=456) %	Crack/Cocaine (n=365) %	Heroin and Cocaine (n=144) %	Marijuana (n=68) %
Completed treatment	491	42	31	47	33	50
Dropped from program	157	15	11	17	5	6
Treatment was unsuccessful	220	16	20	11	30	15
Transferred to another program	55	5	5	3	5	1
Incarcerated during treatment	62	3	8	2	6	1
Logistical problems	105	13	6	7	9	10
Treatment was too costly	131	3	17	4	20	1
Moved away from area	40	4	3	2	4	4
Other	106	6	8	10	10	9

**EXHIBIT IV-7
DRUG USE BEFORE AND AFTER TREATMENT FOR 1,261 INDIVIDUALS
WHO ENTERED PUBLICLY-FUNDED TREATMENT¹**

	DRUG OF ABUSE									
	Methamphetamine (n=220)		Heroin (n=523)		Crack/Cocaine (n=318)		Cocaine and Heroin (n=137)		Marijuana (n=63)	
PRIMARY DRUGS OF ABUSE	Before%	After%	Before%	After%	Before%	After%	Before%	After%	Before%	After%
Marijuana	68	39	39	28	57	28	42	25	89	63
Crack	15	5	15	12	76	42	29	19	12	2
Cocaine	29	11	46	31	51	19	88	64	16	6
Heroin	14	8	95	76	7	3	94	72	3	2
Methamphetamine	90	53	11	6	13	6	15	6	19	14
Polydrug abuse	70	39	62	43	64	25	51	25	31	15

¹ Self-reported use of drug at least five times in the past year.

EXHIBIT IV-8						
POST-TREATMENT BEHAVIOR OF 1,311 INDIVIDUALS WHO HAD ENTERED PUBLICLY FUNDED TREATMENT						
		DRUG OF ABUSE				
VARIABLE	n	Methamphetamine (n=222) %	Heroin (n=532) %	Crack/Cocaine (n=323) %	Heroin and Cocaine (n=148) %	Marijuana (n=66) %
Participation in a 12-step Program ¹ :						
Alcoholics Anonymous	618	63	28	70	43	50
Narcotics Anonymous	550	48	32	56	43	26
Cocaine Anonymous	181	10	4	35	14	8
Currently Employed	411	42	23	39	28	42
Arrested and Booked	440	34	34	28	43	29
Mental Status:						
Suicidal ideation	191	15	17	12	19	6
Suicide attempt	50	6	3	3	6	5
Saw social worker re: mental health	324	24	25	24	260	20

¹ Figures add to more than 100% as participants may enter into more than one program.

profile of individuals who used heroin and cocaine concurrently or heroin alone, and dissimilar to cocaine or crack abusers, who are predominantly African American.

Methamphetamine abusers were less likely than other drug abusers to have been treated for substance abuse prior to this evaluation. If they entered treatment, methamphetamine abusers were equally likely to use inpatient or outpatient treatment and to receive the following services: individual or group counseling, activity groups, educational courses, and 12-step programs. Paradoxically, they had somewhat more difficulty completing these programs. If methamphetamine abusers did not complete their treatment program, it was most likely because they relapsed (i.e., treatment was not successful) or they were asked to leave the program. The 12-month follow-up data revealed that 60 percent of the methamphetamine abusers relapsed, which was similar to users of heroin and cocaine concurrently and marijuana abusers, better than heroin abusers, and less successful than cocaine or crack users.

3. LOS ANGELES TARGET CITIES TREATMENT ENHANCEMENT PROJECT (TCTEP)

CALDATA was comprehensive in its coverage of all regions of the state and all major drug treatment modalities, but its assessment of issues related to treatment process, program completion, and post-treatment functioning was less comprehensive than that of more focused studies. Another California study restricted its focus to one county and a single treatment modality, providing a more detailed assessment of additional aspects of treatment for methamphetamine abusers. In this section, we examine pre-treatment, in-treatment, and post-treatment characteristics of methamphetamine abusers in publicly funded outpatient drug treatment programs in Los Angeles, California's most populous county.

The data presented in this section are part of a larger investigation funded by the Center for Substance Abuse Treatment. This particular aspect of the project evaluated the effectiveness of the Target Cities Treatment Enhancement Project, whose primary goal was to improve the accessibility and effectiveness of substance abuse treatment in cities where substance abuse is most prevalent.

Virtually every adult outpatient program within the Los Angeles metropolitan area participated in the study. Participants were administered an in-treatment interview at 2 to 6 months after admission. Follow-up interviews were conducted 6 months after the in-treatment interview, which corresponds to a 2- to 5-month post-treatment interval.

The sample included 356 clients who participated in the in-treatment interview and 330 clients who participated in the follow-up interview, a retention rate of 92 percent. The sample was selected so that the demographic characteristics of this subgroup were similar to those of the population of individuals who participated in publicly-funded outpatient drug treatment programs in the Los Angeles metropolitan area (California Department of Alcohol and Drug Programs, 1994).

The findings of the data analysis will be presented in three steps. The first section focuses on demographic and pre-treatment characteristics of the participants. Next, client differences with regard to participation in treatment are examined. Finally, findings associated with treatment outcomes are discussed.

Exhibit IV-9 describes the demographic characteristics of the participants. The sample did not differ with regard to the number of males and females who participated in treatment programs for methamphetamine (n=57) or other drugs (n=273). The mean age of participants was 35 years of age with a range of 18 to 54 years. Methamphetamine abusers tended to be somewhat younger than users of other drugs. Similar to the findings from other studies, the overwhelming number of methamphetamine abusers were white, while individuals who entered treatment programs for other drugs tended to be African American. Notably, a substantial percentage of the individuals treated for methamphetamine abuse were Latino. The level of education for users of methamphetamine was likely to be significantly lower than that for users of other drugs.

Exhibit IV-10 describes treatment histories of methamphetamine abusers and abusers of other drugs. Although both groups reported very high rates (>95%) of prior outpatient treatment, they were not equally likely to have received prior treatment in residential or detoxification programs. In contrast to the findings from other data sources previously reported, over 50 percent of the methamphetamine abusers in the Target Cities database had enrolled in outpatient treatment programs at least two times prior to the evaluation. This rate of prior utilization of outpatient treatment was higher than that for abusers of other drugs. Abusers of other drugs were more likely to have been admitted to treatment only once prior to their most recent treatment admission.

EXHIBIT IV-9			
CHI-SQUARE ANALYSES OF DEMOGRAPHIC CHARACTERISTICS AS POTENTIAL INDICES OF METHAMPHETAMINE USE VERSUS USE OF OTHER DRUGS IN AN OUTPATIENT DRUG TREATMENT SAMPLE (TARGET CITIES DATA, LOS ANGELES)			
VARIABLE	n	METHAMPHETAMINE (n=57)	OTHER DRUGS (n=273)
Age ^a			
18 - 24	25	14.0	6.2
25 - 34	152	52.6	44.7
35 - 44	118	28.1	37.4
45 +	35	5.3	11.7
Grade*			
< 12 years	131	36.8	40.3
12 years	113	47.4	31.5
> years	86	15.8	28.2
Gender			
Male	148	49.1	44.0
Female	182	50.9	56.0
Ethnicity**			
African American	134	1.8	48.7
White	103	66.7	23.8
Latino	87	28.1	26.0
Other	6	3.5	1.5

^ap<.001

*p<.05

**p<.10.

EXHIBIT IV-10						
FREQUENCY OF PRIOR TREATMENT EPISODES FOR PARTICIPANTS AT THE LOS ANGELES SITE OF THE TARGET CITIES TREATMENT ENHANCEMENT PROGRAM						
	TYPE OF PREVIOUS TREATMENT RECEIVED					
	Detoxification		Outpatient^a		Residential	
NUMBER OF PRIOR TREATMENT EPISODES	Methamphetamine (n=57) %	Other Drugs (n=273) %	Methamphetamine (n=57) %	Other Drugs (n=273) %	Methamphetamine (n=57) %	Other Drugs (n=273) %
None	82.5	77.3	1.8	0.4	68.4	57.5
1	12.3	11.0	43.9	60.8	17.4	27.8
2	1.8	2.6	33.3	24.9	7.0	7.0
3+	3.5	9.2	21.1	13.9	7.0	7.0

Note: Analyses conducted using chi-square statistic.

^ap<.10.

Notably, the lives of drug abusers often are characterized by a variety of other problems, including criminal activity, employment problems, emotional distress, and social problems. Exhibit IV-11 shows the percentage of substance abusers who reported at the time of treatment admission that they had difficulties in the aforementioned problem areas. Although methamphetamine users and users of other drugs reported a similar lifetime history of arrests and convictions, methamphetamine abusers were more likely to have engaged in illegal activities in the 12 months prior to treatment in comparison to abusers of other drugs. The groups did not differ statistically with respect to work history or current employment status, though methamphetamine users were somewhat more likely than other drug abusers to have had a job at some point in the 12 months prior to treatment. Methamphetamine abusers were significantly less likely to report symptoms of depression or anxiety prior to their admission to treatment programs; however, they did not differ with respect to their self-reports of physical health problems. Finally, methamphetamine abusers were about as likely as other drug abusers to report family problems, but methamphetamine abusers reported lower overall life satisfaction than other drug abusers.

EXHIBIT IV-11		
PRE-TREATMENT CLIENT CHARACTERISTICS OF METHAMPHETAMINE AND OTHER DRUG ABUSERS WHO WERE ADMITTED TO THE LOS ANGELES SITE OF THE TARGET CITIES TREATMENT ENHANCEMENT PROGRAM		
	TYPE OF DRUG ABUSED	
POTENTIAL AREAS OF DIFFICULTY	Methamphetamine (n=57) %	Other Drugs (n=273) %
Criminal Activity:		
Ever arrested	87.7	84.6
Ever convicted	68.4	60.7
Engaged in illegal activities in last 12 months	77.2	65.9
Vocational:		
Ever worked	91.2	88.6
Worked in last 12 months	50.9	33.3
Currently employed	43.9	37.9
Physical and Mental Health:		
Symptoms of depression	22.8	41.4**
Symptoms of anxiety	45.6	68.9***
In good physical health	29.8	26.0
Life and Relationship Satisfaction:		
Having family problems	82.5	75.5
Very satisfied with life	28.1	45.6**

Note: Data analyzed using a chi-square statistic *p<.10; **p<.01; ***p<.001.

Other analyses of these data indicate that the frequency of client participation, generally in group and individual counseling, was associated with positive treatment outcomes (Fiorentine & Anglin, 1996a, 1996b; Fiorentine, Anglin, Gil-Rivas, & Taylor, 1996). Exhibit IV-12 shows that there were no differences between methamphetamine abusers and other drug abusers in terms of the number of individual, family, or group counseling sessions or 12-step meetings they attended.

EXHIBIT IV-12		
MEAN NUMBER OF COUNSELING SESSIONS FOR METHAMPHETAMINE AND OTHER DRUG ABUSERS WHO WERE ADMITTED TO THE LOS ANGELES SITE OF THE TREATMENT CENTER ENHANCEMENT PROGRAM		
	TYPE OF DRUG USED	
TYPE OF COUNSELING PROGRAM	Methamphetamine (n=57)	Other Drugs (n=273)
Group Counseling	8.7 (s.d.=5.2)	9.7 (s.d.=6.8)
Individual Counseling	4.4 (s.d.=4.8)	4.8 (s.d.=4.1)
Family Counseling	0.6 (s.d.=1.3)	0.7 (s.d.=1.9)
12-step Meetings	7.5 (s.d.=9.3)	7.5 (s.d.=8.8)

Note: T-tests were used to compare groups.

Despite the similarity across groups with respect to participation in treatment programs, Exhibit IV-13 shows that methamphetamine abusers were significantly more likely to drop out of their program prior to its completion and were significantly less likely to report that treatment was helpful. Methamphetamine abusers and abusers of other drugs reported the primary reason for dropping out was that they continued to use drugs. Although the difference was not significant, methamphetamine abusers were nearly twice as likely as other drug abusers to report dissatisfaction with their treatment programs; other clients reported that logistical problems were more likely to interfere with completion of the program. Additional reasons given by the participants for dropping out of their treatment program included involuntary discharge, re-incarceration, and unspecified reasons. More than one-third of methamphetamine abusers were likely to relapse during treatment or after treatment, a rate somewhat higher than that of other clients.

EXHIBIT IV-13		
TREATMENT SATISFACTION, DROPOUT RATE, AND REASONS FOR DROPOUT AMONG METHAMPHETAMINE ABUSERS AND OTHER DRUG ABUSERS WHO WERE ADMITTED TO THE LOS ANGELES SITE OF THE TREATMENT CENTER ENHANCEMENT PROGRAM		
VARIABLE	TYPE OF DRUG ABUSED	
	Methamphetamine (n=57)	Other Drugs (n=273)
Percent Reporting That Treatment Was Very Helpful	63.2	78.4*
Dropout Rate	35.1	20.9*
Reasons for Dropout:	(n=20)	(n=57)
Relapsed	35.0	22.8
Logistical problems	20.0	33.3
Dissatisfied with program or program staff	15.0	8.8
Involuntary discharge	10.0	14.0
Re-incarcerated	5.0	7.0
Other	15.0	15.7

* <.05

** p<.01.

To determine the variables that predict substance abuse relapse, a logistic regression analysis was conducted. In the first step of the analysis, two artificially dichotomized variables, treatment completion and treatment satisfaction, were entered. In the second step of the analysis, a dichotomous variable for whether participants were treated for methamphetamine abuse was entered into the equation. Exhibit IV-14 conservatively indicates that if subjects completed their treatment program and were satisfied with the program, then they were significantly less likely to relapse. Whether or not participants were treated for methamphetamine abuse did not predict significant differences in rate of relapse.

EXHIBIT IV-14				
LOGISTIC REGRESSION ANALYSIS: PREDICTION OF RELAPSE BASED ON TREATMENT SATISFACTION, TREATMENT COMPLETION, AND WHETHER OR NOT PARTICIPANTS WERE TREATED FOR METHAMPHETAMINE ABUSE				
STEP	VARIABLE(S) ENTERED	C²	df	p
Step 1	Treatment Completion/Treatment Satisfaction	44.6	2	.001
Step 2	Methamphetamine Abuse	2.5	1	n.s.

Exhibit IV-15 shows that methamphetamine abusers reported significantly greater concern at follow-up regarding their drug use, in comparison to other drug abusers. In comparison to other clients, methamphetamine abusers admitted they had a greater incidence of arrests following their discharge from treatment, were more likely to be troubled by anxiety, were less likely to be troubled by depressive symptomatology, reported a greater incidence of family difficulties, and expressed greater dissatisfaction with their lives. A greater number of methamphetamine abusers felt troubled by their drug abuse (52.6%) than those who reported a need for treatment at the time of follow-up (44.4%); interestingly, fewer abusers of other drugs were troubled by their drug use (36.3%) than those who reported a need for treatment (45.1%).

EXHIBIT IV-15		
CLIENT CHARACTERISTICS AT 6-MONTH FOLLOW-UP OF THOSE WHO WERE ADMITTED TO THE LOS ANGELES SITE OF THE TREATMENT CENTER ENHANCEMENT PROGRAM		
VARIABLE	TYPE OF DRUG ABUSED	
	Methamphetamine (n=57) %	Other Drugs (n=273) %
Drug Use:		
Troubled by current drug use	52.6	36.3*
Need treatment for drug use	44.4	45.1
Criminal Activity:		
Committed a crime	14.0	9.5
Arrested	21.1	10.6*
Vocational:		
Enrolled in school or job training	17.5	22.7
Employed	36.3	40.4
Physical and Mental Health:		
Symptoms of depression	66.7	78.8*
Symptoms of anxiety	49.1	32.2**
In good physical health	78.9	69.0
Life and Relationship Satisfaction:		
Having family problems	75.4	57.5**
Very satisfied with life	33.3	62.3***

*** p<.001

** p<.01

* p<.05.

4. SUMMARY OF LOS ANGELES TARGET CITIES PROJECT

The demographic profile of the methamphetamine abusers sampled for this study was similar to that described in the previously cited studies. This particular cohort of methamphetamine abusers was more likely to have utilized drug treatment programs prior to their current treatment than were treatment clients who were abusers of other drugs. In the 12 months prior to treatment, methamphetamine abusers were more likely than other drug abusers to have engaged in illegal activities and to report greater dissatisfaction with their lives. Their vocational history was not different from that of other drug abusers. Methamphetamine abusers were less likely to report symptoms of anxiety and depression.

With respect to treatment participation and outcome, methamphetamine abusers utilized the same types of services as other drug abusers with a similar degree of frequency; however, they were more likely to leave treatment prior to its completion. More often than other clients, the methamphetamine abusers reported that treatment was not helpful or that they relapsed. In the 12 months following treatment, in comparison to other drug abusers, methamphetamine abusers were more likely to have experienced symptoms of anxiety and legal difficulties, family problems, and greater dissatisfaction with their lives.

V. DISCUSSION

Methamphetamine use and abuse clearly has become a major national public health concern. Methamphetamine is being used across a wide span of age groups, across ethnicities, and across California. Current treatments for methamphetamine abuse and dependence are modestly successful at best and, for certain classes of users, often are unsuccessful.

Given the increased prevalence of abuse and limited efficacy of treatment, prevention officials and treatment providers must devise alternative strategies in an effort to resolve methamphetamine-related problems. In order to improve interventions for methamphetamine abuse, policymakers and clinicians need additional information in two areas: (1) the effects of methamphetamine on the neurologic, psychiatric, and neurocognitive functioning in humans, so that this knowledge may inform treatment providers; and (2) more targeted epidemiological data to be used in guiding prevention strategies. The remainder of the paper will address these issues.

1. CONCLUSIONS

At present, methamphetamine deserves to be targeted as a major drug of abuse. The National Household Survey on Drug Abuse revealed that the prevalence rate of use in the United States is 7.0 percent and, in California, 11.7 percent. In the 12 months prior to being surveyed, 1.3 percent of the nation's householders and 2.2 percent of California's householders had used methamphetamine.

These surprisingly high prevalence rates of methamphetamine use in general surveys were reflected in several more focused epidemiological studies conducted in California. There, law enforcement officials report a dramatic upswing in the number of laboratories seized and the amount of methamphetamine confiscated. Methamphetamine-related mortalities and emergency room admissions also increased dramatically across the state in the last ten years. Data from publicly-funded treatment facilities indicated that 33.4 percent of substance abusers seeking such assistance stated that methamphetamine was their primary drug of abuse.

In addition to the increased level of methamphetamine abuse, the demographic profile of the methamphetamine abuser has diversified. Traditionally, methamphetamine abusers were characterized as low-SES, less educated, relatively young, white males. Today, the majority of methamphetamine abusers still tend to fit this profile; however, as the epidemiological data suggests, many more methamphetamine abusers are Latino and gay, and they may be adolescents, young adults, or middle aged. They may come from rural or urban areas. Recent reports from a

California drug court judge suggest that seemingly well-socialized youths from high-SES backgrounds are starting to use methamphetamine (Lindley, 1997).

In their efforts to prevent methamphetamine abuse, law enforcement officials have promoted legislation to reduce access to the precursors needed to manufacture methamphetamine, have shut down a greater number of laboratories that produce methamphetamine, and have confiscated larger amounts of the drug. Despite these efforts, the available data indicate that more people have initiated use or have continued to abuse methamphetamine. Correspondingly, treatment officials have allotted larger amounts of money to treat methamphetamine abusers; however, methamphetamine abusers show high rates of relapse, particularly within the first month of entering treatment (Rawson, 1997). Overall, these efforts have probably reduced the prevalence of methamphetamine abuse to some degree, but have failed to attenuate the overall levels of incidence and prevalence.

2. RECOMMENDATIONS FOR FURTHER RESEARCH

The rising rates of methamphetamine abuse and the limited success of prevention and treatment efforts has occurred, in part, because limited data exist on the acute and chronic neurophysiological and neurocognitive effects of methamphetamine, the psychosocial factors that influence the likelihood of methamphetamine use, and the specific types of treatment that attenuate the probability of relapse. These topics are discussed in greater detail below.

2.1 The Effects of Methamphetamine on the Neurologic, Psychiatric, and Neurocognitive Functioning in Humans

Our knowledge of the neurophysiologic, psychiatric, and neurocognitive effects of methamphetamine use is limited. The limited data regarding these effects of methamphetamine has restricted treatment providers' capacity to intervene effectively with methamphetamine abusers. As researchers delineate more precisely how methamphetamine affects these domains, it will be easier to formulate more effective treatments that reflect how this drug affects tolerance, craving, and relapse. For example, future studies might examine how medication and behavioral treatments could be tailored to compensate for and circumvent these difficulties to improve treatment outcomes. Other studies investigating the neurocognitive effects of methamphetamine abuse might determine the effects of this drug at different stages of use and abstinence. These neurocognitive changes could be linked to neurophysiological changes and the findings could be used to determine the interplay between these two domains, which could inform treatment process stages and services and lead to better relapse prevention training.

2.2 Epidemiology-Based Considerations for Prevention

To combat the rise in methamphetamine abuse, research also needs to focus on the formulation and implementation of effective prevention strategies. The epidemiological data offer useful information regarding the groups to be targeted. Clearly, methamphetamine is no longer used solely by low-SES, less educated, heterosexual whites; rather, marked increases in use have been documented for Latinos and gays. More importantly, based on the data from juvenile surveys and anecdotal evidence from drug courts, greater numbers of adolescents are abusing methamphetamine.

Thus, one of the most efficient means of reducing the incidence rates of methamphetamine abuse would be to target grade school youths prior to the ages when they are most at risk for abuse. For example, Botvin and colleagues (1995) demonstrated that intensive skills and educational programs reduced adolescents' use of tobacco, marijuana, and alcohol. Moreover, polysubstance abusing adolescents were less likely to use multiple substances after completing the training program.

Risk-reduction strategies also should target adults through educational programs and vigorous prosecution of individuals who violate drug trafficking laws and for manufacturers of precursor chemicals who fail to comply with regulations. To increase the likelihood of effective prevention, programs need to be sensitive to inter- and intra-cultural differences among methamphetamine abusers. Strategies that might be successful for rural whites might not be as successful for gay populations or Latinos. Gil-Rivas, Anglin, and Annon (1997), using a sample of incarcerated Latinos from 13 forensic sites across California, demonstrated intra-group differences within the cohort that could prove to be useful in the development of improved interventions for particular subgroups within this population.

Educational differences across groups of methamphetamine abusers may be an important index with respect to the development of prevention and education programs. Simpler, behavior-oriented programs might be more appropriate for less-educated individuals, whereas more complex, insight-oriented programs might be more effective for more educated methamphetamine abusers. Furthermore, given that individuals with relatively high levels of education tend to be more resistant to brain insults (Satz, 1991), education may be a salient predictor of treatment outcome and the degree to which methamphetamine might permanently affect neurophysiology and neurocognition.

A potential solution to this epidemic is five-pronged research strategy aimed at prevention, neurophysiology, and treatment. Prevention strategies, such as those employed by Botvin and colleagues, could be implemented in the form of pilot programs across different regions of the state to determine their effectiveness. Studies with children and adolescents could identify the factors that place children and adolescents at risk to use methamphetamine. The rich animal literature documenting the neurophysiological effects of methamphetamine should be translated into human-based research in order to clarify the drug's acute and long-term effects on the brain. Data from the studies examining the latter two factors could be employed to design treatments that could take into account the neurophysiological and neurocognitive changes associated with methamphetamine abuse and the psychosocial factors that lead to relapse. Continued examination of the demographic profile of methamphetamine abusers, the effectiveness of various treatment and prevention strategies, and legal activities associated with methamphetamine via epidemiological studies will enable basic researchers, treatment providers, prevention strategists, and policymakers to stay abreast of trends associated with this drug.

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