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EXECUTIVE SUMMARY

UTILITY OF DATA FROM DRUG ABUSE TREATMENT CLIENTS FOR ESTIMATES OF MODELS OF HEROIN CONSUMPTION

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The supplementary work funded by the Drug Enforcement Administration (DEA) on the Treatment Outcome Prospective Study (TOPS) grant from the National Institute on Drug Abuse (NIDA) has two specific objectives: (1) describe the nature of drug consumption behavior of users who contact treatment programs and (2) assess the utility of the TOPS data and current consumption models for estimating usage. The three reports prepared under the grant supplement are based on the in-depth analysis of TOPS data on drug consumption and the assessment of the quality of TOPS data for models of drug consumption. The first report reviews the state-of-the-art of assessing drug consumption, outlines the TOPS research design and methodology, describes the use of heroin and cocaine individually and in combination and discusses the costs of heroin and cocaine use. The second report looks at differences in heroin consumption patterns and costs in different cities over the period 1978 through 1982. A third report focuses on the modeling of drug consumption behavior and the applicability of the TOPS data for existing models. Some preliminary approaches for the utilization of the TOPS data are also described.

Report 1: Drug Consumption Patterns of Drug Abuse Treatment Clients

Demand reduction (treatment) and supply reduction (enforcement) efforts require continuing modification to insure that they can adequately address current and future problems. The changing nature of abuse suggests these tasks will continue to be difficult in the future. The use of multiple drugs of abuse, especially alcohol, marijuana and cocaine in combination with heroin, appears to be increasing in some segments of the population. Among persons entering treatment, patterns of use are becoming more complex. More effective approaches to enforcement, prevention, intervention, and treatment can be developed and implemented with a better understanding of the nature and extent of use of major drugs of abuse such as heroin and cocaine and the current patterns of multiple drug use.

The National Narcotics Intelligence Consumers Committee (NNICC) and other researchers have identified difficulties and limitations in assessing the full spectrum of drug consumption in various populations in the United States. There are three basic types of data sources that can be used to

assess the nature and extent of consumption patterns: (1) indicator data from institutional sources, (2) statistical sample surveys of defined populations, and (3) street ethnographic studies. Each focuses on very different populations (the overlap of which is undetermined at present) and uses very different methodologies. The result is an often confusing set of indicators, many of which show opposite trends.

One readily available source of information on drug consumption is drug abusers who enter drug abuse treatment programs. Three major data bases have been developed to study the characteristics of treatment clients: the Drug Abuse Reporting Program (DARP), the Client Oriented Data Acquisition Process (CODAP) and the Treatment Outcome Prospective Study (TOPS). DARP was conducted in some 50 programs from 1969-1973 and followed selected opioid-abusing clients up to 12 years after treatment. The CODAP data is a management information system that provides limited data on the clients' primary drug of abuse for all clients entering federally-funded treatment from 1973-1981. Since 1981 state reporting to CODAP has been voluntary.

The most current and comprehensive information on treatment clients is available from TOPS. A population of 11,750 clients entering 41 programs in 10 cities from 1979-1981 was interviewed at admission to treatment. Followup interviews have been conducted with samples of 3,600 clients in 1980-1982 and 1000 clients in 1985. The TOPS analysis of drug use (Bray et al., 1982; Craddock et al. 1984; Hubbard, Bray, and Craddock 1985; Hubbard, Marsden, Cavanaugh and Rachal, in press) has described the use of individual drugs such as heroin, cocaine, and primary drug of abuse as well as combinations of drugs. Considerable information was also collected in TOPS on route of administration, cost of drugs used, periods of cessation, reasons for stopping, and substitutions. These data can provide extensive information on the nature of use and the dynamics of change in use patterns over time.

Concurrent with these studies of consumption, there has been increasing attention directed toward the development of dynamic, stochastic models of drug consumption behavior, generally at the aggregate level of analysis (Shreckengost 1981; Woodward, Retka, and Ng 1984; Woodward, Brecht, and Bonnett, 1985). The market-based supply models developed by Shreckengost are designed to estimate aggregate supply and may suggest estimates of the size of the user populations. The current work of Woodward et al. with DEA

is designed to further develop the statistical properties of stochastic models for the estimation of prevalence of users of heroin and other drugs. The in-depth analysis of the TOPS data on drug consumption can greatly enhance the utility of such models. The models can also be used to summarize the diverse pieces of data on drug consumption.

A. Heroin Consumption

Current patterns of heroin consumption are much different today than they were a decade ago. There now appear to be three distinct types of heroin users. The stereotypic "heroin addict" now commonly uses cocaine, marijuana and alcohol in addition to heroin. Few users were found, generally older, who used only heroin. Although a majority of clients in outpatient methadone programs report a pattern of "heroin addict" use, a large proportion (24.9 percent) are "former daily users" and many of the "heroin and other narcotic" users use a variety of other narcotics and other drugs in addition to heroin. The proportion of former daily heroin users among the clients who have used heroin is higher in outpatient drug free (58.9 percent) and residential (39.2 percent). This might be explained in part by our analysis of the prior treatment admission and source of referral data (Craddock et al. 1985). Many of the former daily heroin users have been in treatment (25 percent) or prison (9 percent) immediately prior to entering the TOPS program.

All types of heroin users use a variety of drugs, particularly cocaine, marijuana, and alcohol weekly or daily. Heroin and other narcotics users clearly have the most complex patterns of use in the year prior to treatment. By definition they use heroin and other narcotics at least once a week, but sixty percent use other narcotics daily. Weekly or more frequent use of other drugs is commonly reported, including tranquilizers (45 percent), barbiturates/sedatives (23 percent), cocaine (34 percent) and amphetamines (27 percent). In contrast, fewer heroin users report weekly or more frequent use of tranquilizers (18 percent), barbiturates/sedatives (7 percent), or amphetamines (6 percent). Many former daily heroin users, despite their abstinence from heroin, report weekly or more frequent use of other drugs including other narcotics (27 percent), cocaine (16 percent), and minor tranquilizers (22 percent). These results show clear differences in drug consumption patterns among the types of users.

Patterns of heroin use before treatment also affect use after treatment. "Heroin addict" type users are 2.64 times more likely to resume heroin use after treatment than former daily users. Heroin and other narcotic users are 1.56 times more likely to use than former daily users. Those former daily heroin users who used other narcotics before treatment are almost three times less likely to use heroin after treatment than former daily users who used no narcotics. These results support the concept that a variety of substitutes are used for herion. About one third of users report use of other narcotics and one fourth report use of tranquilizers to substitute for heroin.

B. Cocaine Use

Cocaine was widely used by TOPS clients in the year before entering TOPS treatment, but its use became less pervasive in the year following TOPS treatment. In the year before entering TOPS drug abuse treatment programs, over one-half of clients in the 1979 and 1980 cohorts entering outpatient methadone, outpatient drug free, and residential programs had used cocaine at least once ("any use"). The percentage of clients who reported any use in the year after having TOPS treatment decreased to about one-third.

About 30 percent of outpatient methadone and residential clients and less than 20 percent of outpatient drug free clients were weekly or more frequent cocaine users in the year before treatment. In the year after treatment, weekly or more frequent use had decreased to about 15 percent of outpatient methadone and residential clients and 7 percent of outpatient drug free clients.

Examination of these prevalence figures suggests that cocaine use is increasing among drug treatment populations. First, cocaine use among TOPS clients in 1980 was higher than in 1979. Compared with findings from the DARP study almost a decade earlier, the percentage of clients entering TOPS treatment who reported any cocaine use had increased from one-third in DARP to one-half or more of TOPS clients, and the percentage who reported weekly or more frequent use increased from 16 percent in DARP to between 20 and 30 percent in TOPS, depending on the modality. Both DARP and TOPS clients decreased cocaine use following treatment, but the declines were greater among TOPS clients. The percentages of TOPS clients reporting cocaine as the primary drug of abuse are also slightly higher than the 5.8 percent of CODAP admissions except among TOPS outpatient methadone clients. While earlier research suggested that cocaine use was particularly prevalent among methadone

clients, cocaine use is no more likely among TOPS methadone clients than clients of other modalities. However, cocaine use was more often the primary drug of abuse among methadone clients in the year after treatment.

Cocaine use is also more likely among those re-entering treatment in the post-TOPS period suggesting that cocaine use may increase as use of other drugs declines. The fact that cocaine use is more likely among those with no pre-TOPS admission may reflect a cohort effect in which "newer" drug treatment clients are involved in the use of "newer" drugs rising in popularity such as cocaine.

C. Patterns and Costs of Heroin and Cocaine Use

Preliminary analyses of use of heroin and cocaine patterns revealed that about one in four clients with a history of daily heroin use were using both heroin and cocaine weekly or more often in the year prior to treatment. About one fourth of these heroin/cocaine users continued this combined use after treatment. One in ten continued weekly heroin use, but stopped their cocaine use. Characteristics and other behaviors related to consumption revealed no clear differences among the groups.

As the frequency of heroin and cocaine use increases, so does the amount reported spent on illegal drugs (Collins, Hubbard and Rachal 1985). Nonusers of heroin reported spending $1,527 on illegal drugs in the year before treatment; daily heroin users spent an average of almost $16,000. Nonusers of cocaine reported spending $3,739 on illegal drugs; daily cocaine users reported spending $18,908 on their drug purchases. Daily users of both heroin and cocaine said they spent more than $21,000 on drugs in the year before they entered treatment.

At the same levels of use, those using cocaine reported spending more money on drugs than did users of heroin. Those using heroin less than weekly reported spending $4,755; those using cocaine less than weekly said they spend $6,264 on drugs. Daily cocaine users spent approximately $3,000 more on drug use than did daily heroin users ($18,908 vs. $15,989). Very few clients report being daily users of heroin to the exclusion of cocaine. Also, the cocaine only daily user spent $5,573 less on drug usage in the year before treatment than did the heroin only daily user. It is the daily heroin and cocaine users and the daily heroin only users that spent the most for their drug usage.

The findings of regression analysis in the case of daily cocaine use are clear and important. Until recently it has been assumed that cocaine was not a criminogenic force toward income-generating crime because cocaine does not have the physiological addictive power of heroin and because cocaine users were viewed as unlikely to come from population groups with high crime rates. These assumptions appear to be unjustified. Weekly and daily cocaine use are associated with high levels of illegal income.

Daily use of heroin in the year before treatment is associated with $8,426 more in illegal income for the same period than nonuse of heroin. Daily cocaine use before entering treatment is associated with $7,206 more in illegal income than nonuse of cocaine. Weekly use of cocaine is associated with $5,664 more illegal income than nonuse of cocaine. It may also be valid to infer that individuals who reported daily use of both heroin and cocaine, of which there were 332 in the 1979 TOPS cohort, had $15,632 ($8,426 + $7,206) more illegal income than individuals who did not use both of these expensive drugs.

Report 2: Differences in Consumption and Costs over Time and Across Cities

The TOPS data clearly show major differences in drug use patterns over time and among cities. Not only do the rates of heroin use and cocaine use (80 percent weekly use or daily use in Chicago compared to 40 percent in New York methadone admissions) vary considerably but daily cost of heroin ranges from under $80 in New York and Detroit to almost $200 in Phoenix in 1981.

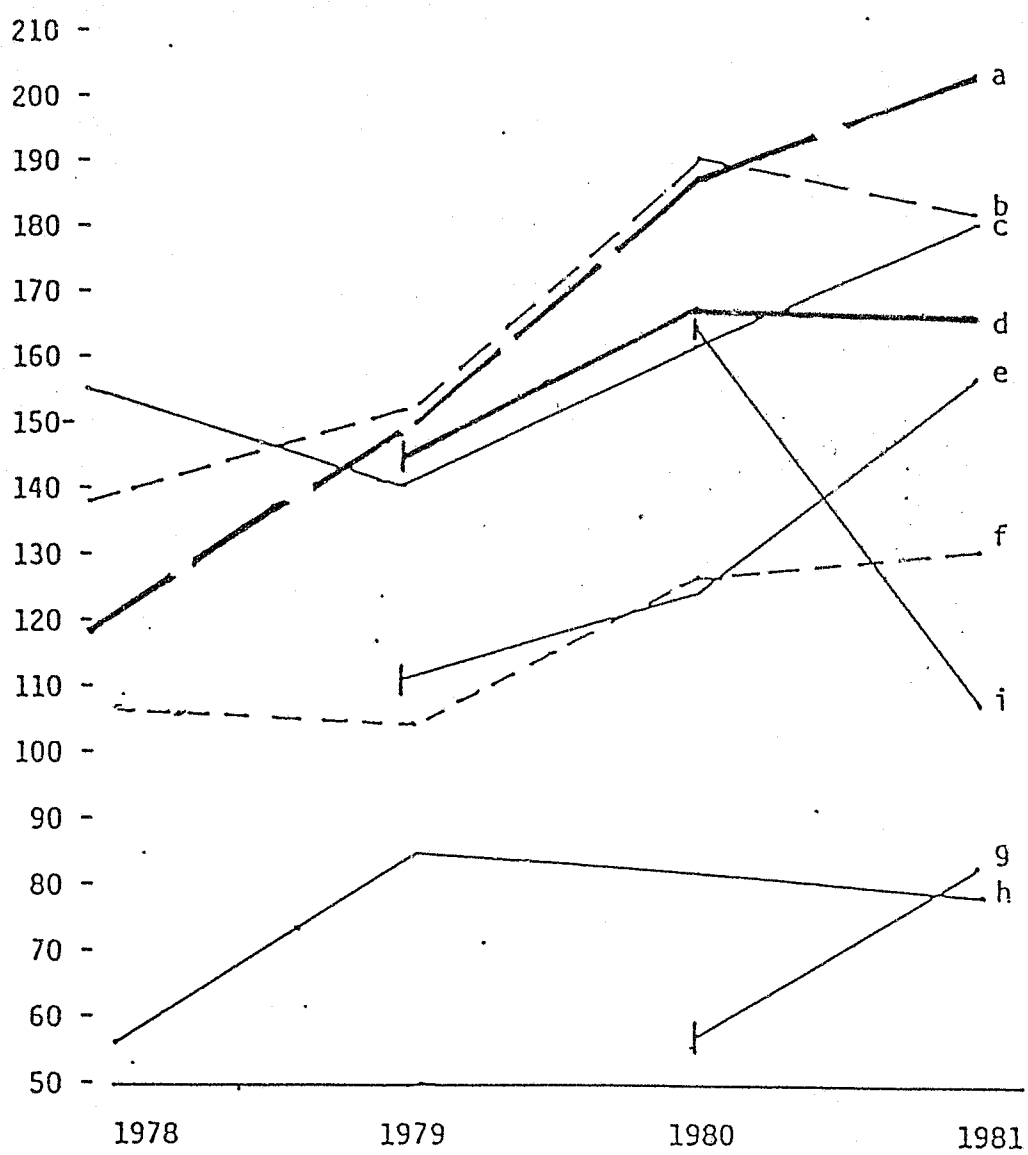
This report focuses on the heroin consumption patterns of clients entering drug abuse treatment programs in nine cities participating in the Treatment Outcome Prospective Study (TOPS) during the years 1978-1981. Data in this report are based on self-reports of clients who: (1) used heroin on a weekly or more frequent basis in the year prior to intake into a TOPS treatment programs and in the year following release from a TOPS treatment program, or (2) have a history of weekly or daily heroin use over a period of years.

The following discussion summarizes the major findings on heroin use patterns as reflected in client's expenditures for heroin, substitution for other days for heroin, and cessation of heroin use.

A. Amount Spent for Heroin (1979-1982)

Findings discussed in the report (see figure 1) suggest a steady increase in expenditures on heroin from 1978-1981 among those who used weekly

Figure 1: Average Amount Spent for Heroin Per Day by Calendar Year of Last Daily Use* for Weekly or Daily Users in the Year Before Treatment



a - Phoenix
b - Portland
c - New Orleans
d - San Francisco
e - Miami
f - Chicago
g - Detroit
h - New York
i - Philadelphia

*Data for Miami and San Francisco covered 1979-1981; Detroit and Philadelphia covered 1980-1981.

or more often in the year prior to treatment in Phoenix, Portland (Oregon), New Orleans, San Francisco, Miami, and Chicago. This increase in cost to the user parallels the inflation rate in the economy during 3 years. Slight deviations from this pattern were evident in 1979 intake data which indicate a significant drop and subsequent rise in amount spent for heroin in New Orleans.

This analysis suggests that the heroin market differs significantly in Detroit and New York as compared with other TOPS cities. The average amount spent for heroin by TOPS clients in these cities is consistently lower than that in other TOPS cities. Data indicate that the price of heroin in New York increased sharply from 1978 to 1979. In 1979 the price began to drop slightly and leveled off between 1980 and 1981. This finding suggests that the inflationary trends operating on heroin markets in the other TOPS cities were not influential in New York and Detroit. In general, both intake and followup data suggest that heroin prices were somewhat higher in Phoenix and Portland than in the other TOPS cities. Such a finding may indicate that heroin was less readily available in these cities during the years in question.

Figure 2 depicts expenditures of heroin users in a slightly different manner. Data used in construction of these graphs describe spending patterns of clients who have a history of regular (daily or weekly) heroin use over a period of years. The clients interviewed in 1979-1981 were asked about the cost of heroin when they last used heroin daily. Thus, these clients differ from those described in figure 1 in that they may or may not have been regular users in the year before treatment. Figure 2 suggests a more erratic spending pattern among clients in this group.[1] Inflationary trends are much less noticeable in figure 2 than in figure 1. Where inflation does occur, it is not steady or strong but shows numerous peaks. Recall problems as well as the bias due to characteristics of clients who stopped daily use in different years could have affected the results.

B. Substitution for Heroin (1978-1981)

The degree of substitution of other drugs for heroin in TOPS cities may serve as an indirect indicator of fluctuations in the local heroin market. Research on heroin consumption has shown that substitution is common when the supply of heroin is low or when cost is extremely high. Figure 3 summarizes

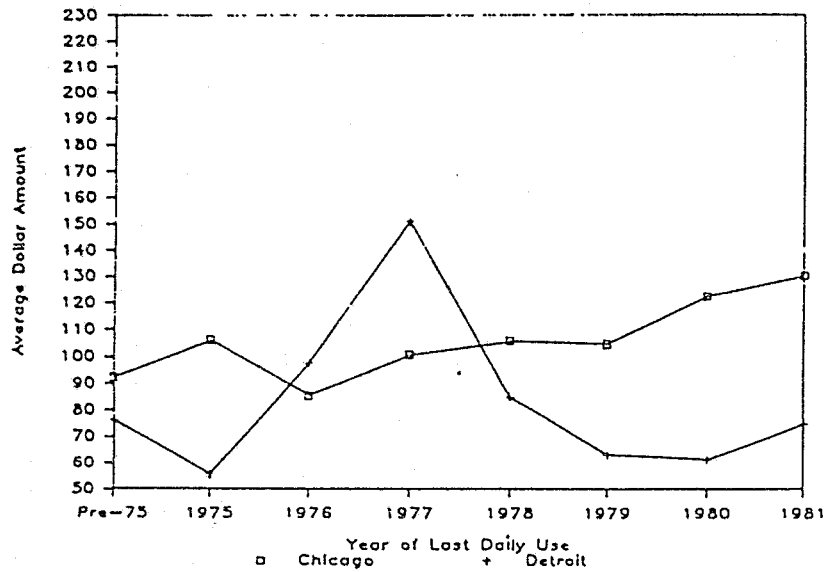
[1]The number of clients in this group was low in Philadelphia and should not be taken as representative of the overall user population in this city.

Figure 2

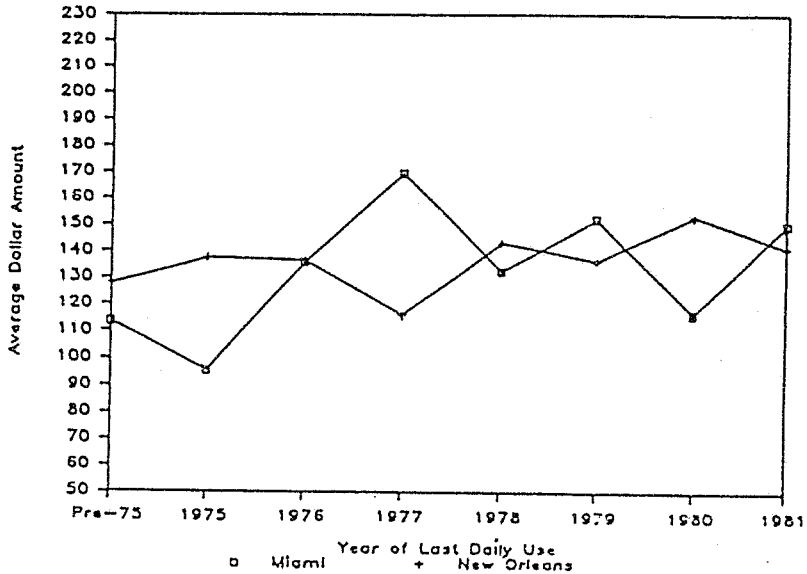
Average Daily Amount Spent for Heroin in Year of Last Daily Use by City

For Clients With A History of Regular Heroin Use

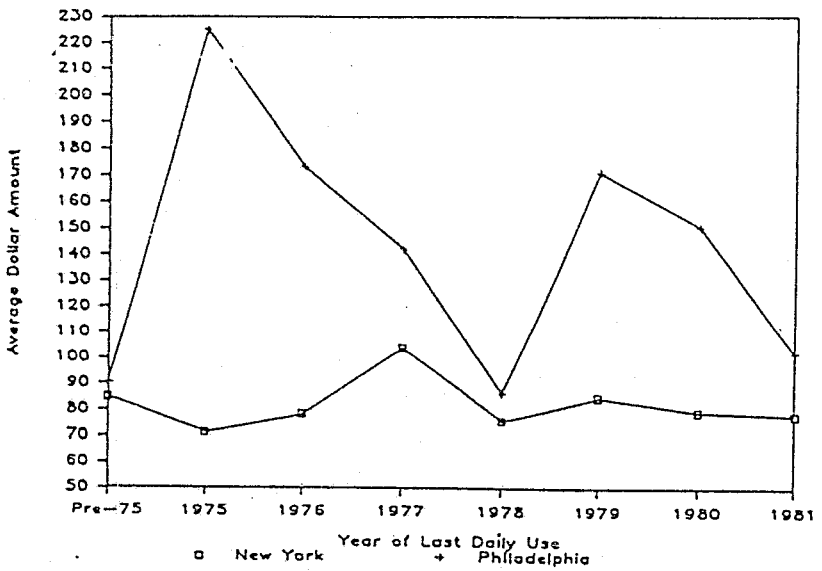
North Central Region



South Eastern Region



North Eastern Region



Western & South Central Regions

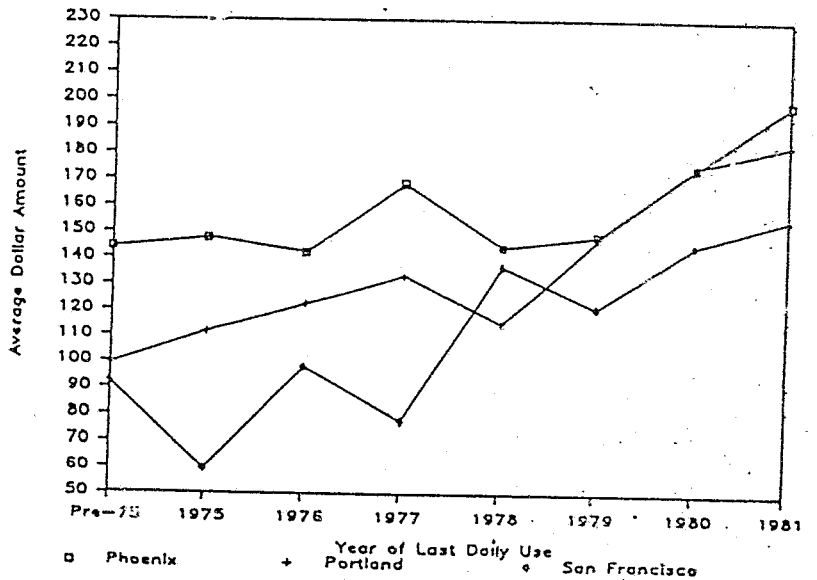
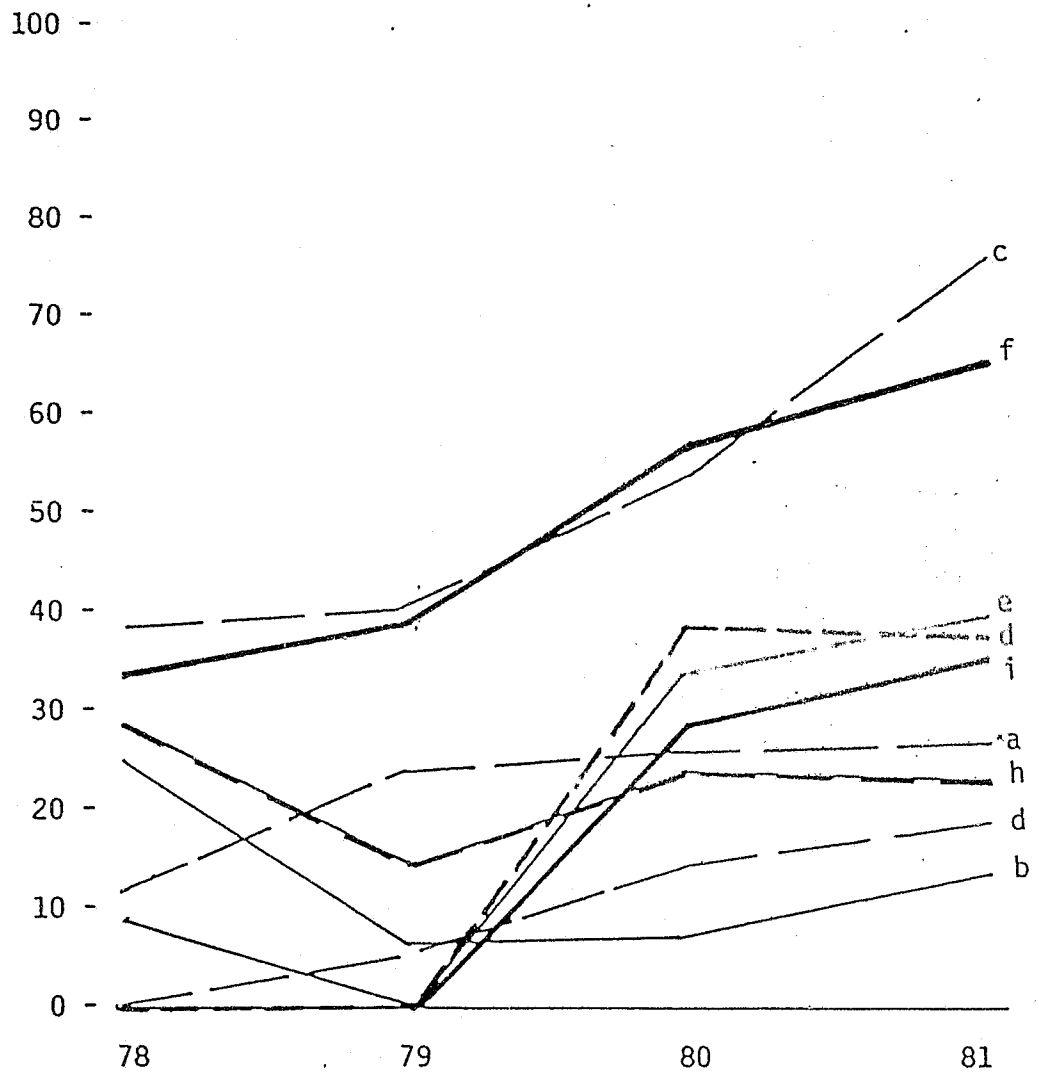


Figure 3. Percent of Clients Reporting No Substitutions for Heroin During Year of Last Daily Heroin Use for Nine TOPS Cities



a - Phoenix
b - Portland
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data based on clients statements that they used no heroin substitutes in the year before intake. This graph reflects an upward trend in the percentage of clients reporting no substitutions from 1978-1981. This result may be interpreted as further confirmation of research indicating that current heroin users, compared to users in the early 1970s, are more likely to use a variety of drugs. A slight drop in the percentage reporting no substitutions is evident in 1979 data for New York, Miami, and Portland. In Portland, the percentage reporting no heroin substitution continued to drop in 1980 and rose slightly in 1981. Heroin users in New Orleans and Chicago were the least likely to use substitutes for heroin.

Whereas the degree of substitution is an indicator of heroin availability, the type of substitutes chosen by heroin users may be an indicator of the availability of other types of illegal drugs. The most commonly mentioned heroin substitutes among TOPS intake clients were narcotics, barbiturates, and valium. In most cities methadone was not a commonly used substitute. In Miami, however, 44 percent of clients whose last daily use was in 1980 reported substituting methadone for heroin. In New York a similar, though stronger, pattern emerged. New York clients reported using illegal methadone as a heroin substitute at a rate of 63 to 80 percent. In contrast to clients in the other TOPS cities, New York clients used valium and barbiturates quite infrequently as substitutes.

Data from clients who have a history of heroin use also suggests that methadone is a highly preferred heroin substitute. This finding should be interpreted with consideration of the fact that methadone was the preferred substitute among TOPS clients in New York during the time period covered by this report. Thus, because the New York sample size was large, a significant proportion of this trend comes from this single city. The influence of the community/city environment as well as the unique features of the heroin market in New York must be considered.

C. Cessation of Heroin Use

Clients with a history of regular heroin use were asked at intake to indicate the length of time elapsed since they last used heroin daily. In New York 56.5 percent stated that they used daily until the week they entered treatment. This figure was lower in other cities, ranging from 8.4 in Phoenix to 40.2 in Philadelphia. Between 5 and 23 percent of clients, depending on the city, stated that they had not been daily users for five years or more.

The clients with a history of regular use were also asked the longest period of time they had gone without heroin use prior to intake. The modal response was "1-2 years" for clients in each city. A small proportion of clients in six cities (excluding Detroit and San Francisco) had gone no more than one week without heroin prior to intake. This proportion was over 15 percent in Portland.

Self-reports of reasons for discontinuing heroin use may provide indirect indicators of local heroin markets. TOPS clients were asked to state the reason or reasons they stopped using heroin in the year prior to or following treatment. Possible reasons for cessation included: client accepted unemployment; the cost of heroin was too high; client was in jail; client wanted to change his/her lifestyle; heroin was not available; client switched to another drug; client entered treatment; and other. All reasons reported by each client were recorded.

Analyses of both intake and followup data suggest that the desire to change the addict lifestyle is overwhelmingly the most frequently mentioned reason for cessation. The proportion of clients citing change in lifestyle often ranged as high as 60 percent and in most cities ranged from 40 to 50 percent.

In addition, entering treatment and being in jail were commonly cited reasons for cessation. Market factors such as cost and availability were cited infrequently in most cities. In New Orleans, the cost of heroin was cited by approximately 20 percent of intake clients for 1978 and 1979. In most cities, however, cost and availability were cited by less than 10 percent of clients in both intake and followup interviews. These findings suggest that, from the users' view, cost and availability of heroin in the nine TOPS cities during the years in question were not major reasons to stop use. Supply reduction strategies can affect heroin consumption, but the relative stability of expenditures on heroin and the ready availability of substitutes may not force users into treatment.

Report 3: Models of Heroin Consumption

A number of models of heroin consumption have been explored. Based on the initial review, a number of models could easily be elaborated and better specified with the knowledge derived from TOPS data.

The three models which seem to warrant the closest attention are:

- the prevalence estimates by Woodward et al based on capture recapture,
- the application of POPSIM (Cooley et al. 1978) to estimate sizes of user population based on knowledge about transition probabilities into and out of drug use ,
- a model of community risk factors which affect levels of individual drug use developed by Greenberg and Roberson (1978).

The global models of heroin supply and consumption such as the Persistent Poppy model, and the supply models developed by Schreckengost deal with variables that are generally not available for TOPS data. The TOPS data could provide some information to revise key components of these models, but the major assumptions underlying the models require data which is not available in TOPS.

Further steps can be taken for the development of modeling efforts. Briefly our preliminary ideas in this area are:

1) Test existing models using the new assumptions indicated by TOPS data analysis. Specifically:
   - data on types of heroin users, levels of consumption, readdiction liability and probability of reentering treatment could be used to refine the Woodward et al estimates,
   - data on treatment readmission and rearrest rates and time of relapse would be used to elaborate and test capture-recapture methodologies.
   - data on the transition probabilities and rates could be used in dynamic models such as POPSIM to project user population
   - data on 1980 census tract or block level could be abstracted for TOPS clients in selected cities to replicate the Greenberg studies at the individual user level.
2) Develop new models of consumption behaviors based on TOPS results. Specifically:
   - models incorporating the extensive use of multiple drugs is needed to better ascertain substitution patterns and the potential hydraulic effects of different enforcement strategies.

- models of the addiction and treatment careers are needed to better predict the short and long term future problems.

3) Generate prevalence estimates with new and existing models. Specifically:
   - projections could be generated and compared based on multiple models and different basic assumptions
   - recommended methods of collecting data to make more precise prevalence estimates and to validate key assumptions.

The preliminary results of the POPSIM model and a revised model based on assumptions derived from TOPS tended to overestimate consumption in 5- to 10-year projections. The models do not, at this time, deal adequately with the dynamic movement of users into and out of heroin use patterns. The number of new users and "old" users in the model accumulates with each succeeding year, producing large overestimates.

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