Evaluating Policy Options and Benefits of Reducing Cocaine Usage and Cocaine-related Crime

Final Report

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ABSTRACT

Policymakers charged with the task of mitigating the consequences of drug use cannot operate effectively without accurate information regarding the extent of drug use. Accurate, reliable estimations of the prevalence of drug use require improved statistical techniques to compensate for the shortcomings of the existing databases. In order to provide local, state, and national estimates of cocaine use as a basis for evaluating policy options, this study applied three estimation methodologies: synthetic estimation, multiple-capture census, and system dynamics. Results from applications of multiple estimation models can provide more than mere enumeration of drug users--such estimation reveals inadequate treatment capacity and low utilization of treatment services among some groups, especially among criminal justice populations. Model projections show that expanded treatment programs may be more effective than drug interdiction in stemming the use of cocaine. Incarceration for drug law offenses is noted as an expensive but similarly effective intervention. Highest confidence in estimation is achieved when multi-method approaches complement each other and compensate for database inadequacies and inherent flaws in single-method approaches.

PREFACE

This report describes work accomplished for an NIJ-funded project on Policy Evaluation (90-IJ-CX-0014). This grant is a continuation of an earlier project on Cocaine Prevalence Estimation (87-IJ-CX-0042). The major objectives of the two studies are to develop and improve techniques for prevalence estimation, thereby increasing the accuracy of the estimates; to apply these techniques to derive prevalence estimates for cocaine use among general and criminal justice populations; and to examine the applicability of these models for policy analysis. The report includes program codes for the models developed (Appendices A and B).

We wish to recognize several government agencies for their generous support of the present research and the individual researchers whose incisive comments and suggestions contributed to the work of the team. In particular, we thank Dr. Bernard Gropper, Director of the Drug, Alcohol, and Crime Program at the National Institute of Justice, for his full support of our prevalence estimation research. We thank the National Institute on Drug Abuse, and particularly Mr. Mark Brodsky for kindly supplying data tapes of the National Household Survey on Drug Abuse and DAWN. The FBI provided UCR data, and the DEA provided STRIDE data. Dr. Peter Reuter of the RAND Corporation offered helpful comments throughout the course of the project. It should be noted that the viewpoints and opinions expressed in this document are those of the authors and do not necessarily represent the official positions of the funding or cooperating agencies.

1. BACKGROUND AND PROBLEM STATEMENT

1.1 Issues and Objectives

Monitoring the nature and extent of drug abuse and drug-related crime is a continuous necessity for governmental agencies. Unless major efforts are made to provide a complete count of the user population--an almost impossible activity--better estimation of the number of individuals abusing various types of drugs must rely on appropriate statistical techniques to remedy the data deficiencies.

The UCLA Drug Abuse Research Center has been conducting research to develop and improve prevalence estimation techniques, particularly for cocaine use. During the course of developing defensible prevalence estimation methodologies, the research team has identified four areas of complexities that compromise prevalence estimation: definitions of the user population, data availability, data suitability, and technique validity. Appendix C contains a detailed description and discussion of relevant issues.

The purpose of the project was to provide improved prevalence estimates by developing and applying multiple methods to derive estimates for national, regional, and local cocaine use prevalence for several calendar years among both general and criminal justice populations. The study also focused on possible applications of these techniques to policy analyses. Hypothetical consequences were evaluated for alternative intervention policies pertaining to such areas as prevention, treatment, and legal enforcement.

This report describes the general approaches taken to accomplish the project goals. The rest of the report provides brief descriptions of three specific methods that were used and their application results. Detailed descriptions of these methodologies and their application are available in relevant appendices referenced in the report. The report concludes with recommendations for future work leading to improved prevalence estimation methodologies.

1.2 Study Approaches

Aspects of cocaine use prevalence and related influences relevant to the study are represented in a general sense in Figure 1. This figure illustrates possible population flows among several user categories as well as some social interventions and socioeconomic factors that may influence the flows. Also shown is the existing indicator data that are available to provide some measures of these influences.

To overcome the incompleteness and the differences in the data as well as other complexities involved in prevalence estimation, a complementary multi-method approach was taken for the present study. The methods that were applied include synthetic estimation, multiple-capture/Semi-Markov modeling, and system dynamics (see Table 1). Most methods used cross-sectional or time-limited data. Trend data, however, are analyzed within the context of the system dynamics model.

All of these estimation methods have their strengths and weaknesses. Limitations also exist in the interplay between methodologies and data sources and, therefore, in the specific populations that can be encompassed by one particular approach. For example, the operational definition of the user population estimated by one method may differ from the operational definition of another because the methodologies applied require different databases, which themselves define users in different ways. As an example, the National Household Survey contains drug use information classified into lifetime use, last year use, and last month use for a population available in households, while the Client-Oriented Data Acquisition Process (CODAP) system contains treatment admissions for drug use problems. Yet, by applying several complementary approaches, each capitalizing on some salient aspects of the prevalence problem, confidence in the results can be increased or, at the least, inconsistencies identified.

2. SYNTHETIC ESTIMATION

2.1 A Population Projection Model

The synthetic estimation method develops prevalence estimates for new populations by using several more readily available data sources or indicators from known populations, matching various predictor variables (usually demographic characteristics such as ethnicity, age, gender, or arrest charge), and determining appropriate weighting schemes. Population projection models are based on the logic that, if the drug use prevalence rates are established for a population having a known demographic distribution, then the relationships between prevalence and demographic characteristics can be transferred to another population, either smaller or larger than the first (See Appendices D and F).

2.2 Application and Results (for Los Angeles County)

In Los Angeles, criminal justice system data on arrestees are available in several forms and provide a basis for synthetic estimation application. One data source comes from the Drug Use Forecasting (DUF) project sponsored by the National Institute of Justice. Since 1987, Los Angeles has been a site for the DUF project. Interviews are conducted quarterly with adult men and women at county jails, usually within three days after their arrest. Urine specimens are collected and tested for ten drugs including cocaine. A second source is the California Bureau of Criminal Statistics (BCS), which documents all arrests made in California. Each arrest record contains the name of the arrestee, date of arrest, offense charge, and demographics including gender, race/ethnicity, and age. Appendix D provides a detailed description of the estimation methodologies applied to derive prevalence estimates of drug users among Criminal Justice Systems (CJS) populations. The results are briefly described below.

Cocaine use among arrestees. The size of the arrestee population of a given year can be obtained by matching arrest records from The Bureau of Criminal Statistics (BCS) within that year using unique identifiers. In this way, events (arrests) are reduced to persons (arrested). A simple population projection method is then applied, which maps cocaine positive rates observed by DUF to the estimates of the respective populations. To increase the precision of the estimates, the application of the population projection method considers predictor variables that include gender, ethnicity, and types of offense (see Table 2 for relevant data).

Cocaine use among criminal population. To obtain estimates of the total criminal population (including those who committed crimes but were not apprehended) in Los Angeles in 1989, a truncated Poisson model was applied to the arrest frequency distribution. The resulting estimates of criminals include those who were not arrested during 1989. Assuming that patterns of drug use for those not arrested were similar to patterns for those arrested, a population projection method as described above was also applied to criminal population estimates to ascertain the number of cocaine users among them.

Estimated cocaine users in CJS populations in Los Angeles. The estimation results based on CJS data are presented in the bottom of Table 3. It is estimated that there were 145,395 arrestees and 371,730 criminals who used cocaine in Los Angeles in 1989.

The synthetic estimation model relies on comprehensive data for its utility in projecting populations. The method is particularly appropriate where complementary data have been corroborated by official records, as in the estimation of CJS populations for which extensive documentation is available.

3. MULTIPLE-CAPTURE CENSUS

3.1 A Latent Markov Model

A Markov model for estimating the size of social populations was developed by Wickens (1991). In distinction from traditional ecological open population models that count the individuals captured in each sample, this longitudinal model is based on the variety of capture histories. The model characterizes capture probabilities by a two-step sampling process. The initial sampling probability is governed by a stochastic process in which users are drawn from a large population of non-users. After this first observation, the balance of the process is governed by the dynamics of a state structure that represents the evolution of drug consumption patterns and their repeated observations by some indicator system (e.g., treatment admissions). This process forms a Markov chain and the procedures generate estimates of the size of the population from which the observations are drawn.

In the simplest form of the model used here, the members of the target population are classified into three states: a state N of never-observed individuals, a state T containing currently observed individuals, and a state U of individuals previously observed but currently unobserved. New individuals enter the target population through N and can depart it from any of the three states. A Markov chain governs transitions among the states once the individuals pass through N. The initial recruitment probability is assumed to be the same as the probability of redetection (from U to T), which allows the hidden component to be estimated from the observed pattern. Maximum-likelihood size estimates are made by fitting the model to the capture histories. Appendix F provides detailed descriptions of the model.

3.2 A Comparison of Multiple-recapture Models

Brecht and Wickens (1991) compared three multiple-capture approaches for hidden-population estimation: a set of closed population models based on fitting association parameters to an incomplete contingency table, the Jolly-Seber open population model, and the open population approach based on the latent Markov process developed by Wickens described above. Simulated data were generated to resemble the complex process involved in cocaine

use, using a 26-state Markov model. While this simulation model was judged by an expert to be realistic, it was too complex to be used as the basis of estimation, and it violated many of the assumptions of the multiple-recapture methods. Data generated from this simulation model allow comparisons of the performance of various prevalence models and determination of how robust these models are. The estimation methods were applied to the simulated data, the population size was estimated, and the results compared with the actual number of simulated users. The results suggest that a serial association model can estimate overall frequencies during an extended interval but that a dynamic model is necessary to estimate changes in size from period to period. In general, the Markov model tended to produce a higher number than data simulated under various conditions, and the Jolly-Seber model underestimated the populations by nearly 50 percent. Appendix G presents a detailed description of relevant results.

3.3 Application and Results (for Los Angeles County and California)

Since 1982, the State of California has maintained a data system (the California Drug Abuse Data System, or CAL-DADS) that records information on drug treatment clients at the time of drug treatment admission and at the time of discharge. All publicly funded treatment programs as well as private methadone maintenance and detoxification programs provide data to CAL-DADS. An individual's treatment history can be obtained by matching separate records, based on various unique information such as initials of last and first name, birth date, and sex. The treatment history data allow the determination of whether an individual is in treatment or not in any given time period. These data characteristics lend themselves naturally to multiple-recapture methods for estimating the hidden components of these populations. Cocaine treatment history data from CAL-DADS during 1984 through 1989 were used to estimate the number of cocaine users in Los Angeles County and in California as a whole during those years.

Estimates for treatment susceptible populations. Estimates based on the treatment data are generalizable to user populations that resemble the observable treatment clients, or those who have some non-zero probability of entering treatment. This population is referred to as treatment susceptible populations. The latent Markov multiple-capture model was applied to CAL-DADS cocaine history data, and estimates for California and Los Angeles are presented in Table 3. In 1989 there were an estimated 331,205 cocaine users in California susceptible to treatment, 100,594 of whom were in Los Angeles County.

The multiple-capture approach is statistically sound and is particularly appropriate in the estimation of treatment-susceptible population for which multiple observations of the population are available.

4. SYSTEM DYNAMICS MODELING

System dynamics is a general methodology for analyzing dynamic phenomena through the use of simulation models based on information-feedback control theory. A system dynamics model consists of an interconnected set of difference equations representing continuous-time movement and accumulations of people, materials, and information. After being assigned initial conditions consistent with historical data, the set of equations is used to generate output over time. If the model is a valid one, this output will closely mimic the true course of events and the model may be used for prevalence estimation and for making conditional forecasts.

4.1 A System Dynamics Model

Homer (1991) developed a system dynamics model of cocaine use for the purpose of generating national prevalence estimates and projections consistent with available indicator data and knowledge of underlying processing (see Appendix H for a detailed description). The model considers the prevalence of cocaine use in a large framework including social climates,

morbidity and mortality consequences, legal sanctions, and so on. The model also provides prevalence projections and likely changes under various hypothetical alternative policy scenarios.

This model has been demonstrated to successfully integrate a variety of national indicators in a way that is (1) consistent with existing data and knowledge of cause and effect, (2) produces estimates for a variety of prevalence measures over an extended period of time, (3) clarifies the dynamic mechanisms underlying observed tends, and (4) projects those trends into the future under a variety of alternative scenarios with possible implications for public policy.

4.2 Estimates for the Nation

Included in Table 3 are numerical estimates of cocaine users based on the system dynamics model, for five selected years, and their percentage breakdown among the major user categories. It is estimated that by 1990, about half of all past-month users were compulsives, and about two-thirds of all past-month users preferred crack over powder. At the same time, only one-twelfth of lifetime users were current or past compulsives and only one-sixth were current or past crack users. These numbers underscore the two dominant cocaine trends of the mid-to-late 1980s: the massive exodus from use by casual users of cocaine powder, and the rapid development of a population of crack users who use compulsively more often than not. The growth of compulsive use is directly responsible for an increase in pure cocaine consumption of some 70% from 1980 to 1990; and where compulsives may have once accounted for less than 60% of all consumption, they now account for perhaps 95%. This increase in the quantity of cocaine consumed occurred at the same time that the price of cocaine decreased so that dollar-value sales did not increase and may actually have subsided a bit during the late 1980s.

4.3 Evaluating Policy Option Scenarios and Implications

Policymakers and drug abuse researchers alike may benefit from the development of methods and models that will improve their understanding of drug prevalence. System dynamics modeling is particularly useful in this regard.

In evaluating various policy options and their likely impact, prevalence projections corresponding to four possible scenarios, in addition to the baseline projections, are graphed in Figures 2 and 3. In each of these scenarios, a one-time change of 40% is made in a single key parameter, a change which (1) is made during 1992 and remains in place for the remainder of the simulation and (2) has the effect of reducing the past-month prevalence fractions. The testing of these scenarios is intended to aid understanding of the relative importance and over-time impacts of possible future events or policy interventions. Such testing is definitely not intended to establish confidence limits or lower bounds for future prevalence, and the 40% figure for all parameter changes was selected for ease of analysis rather than as a statement of probable impact.

Future scenario #1: Prevalence of marijuana use--a key indicator in the cocaine system dynamics model--drops by 40% in 1992. From a policy standpoint, such a drop might occur as the result of renewed efforts at illicit drug use prevention in the schools. Casual cocaine use is initially reduced, which cascades to a reduction in compulsive use, and then feeds back for additional reduction of casual use due to reduced social exposure. Relative to the baseline, casual cocaine use declines 55% during the subsequent ten years, compulsive use declines 40%, and both will continue to decline in the years beyond 2002. This simulation again points to the importance of illicit drug popularity in influencing cocaine user trends over the short and long term.

Future scenario #2: Voluntary abstention rates for compulsive cocaine users increase by 40% in 1992. Such an increase might occur as the result of a major expansion of treatment

programs. Relative to the baseline, compulsive use declines by over 20% as a result, reaching this level within about five years. Due to this reduction in prevalence, there is some beneficial spillover effect on casual users, but this amounts to only 6% reduction relative to the baseline by 2002. Treatment programs have the primary effect of removing compulsive users from the population, leading to only minor reduction in casual use.

Future scenario #3: Drug-law arrest rates increase by 40% in 1992. Such a policy has the twin effects of increasing both incarceration and deterrence levels. The increase in incarceration primarily removes compulsive cocaine users from the population, having a targeted effect similar to the expansion of treatment programs. In contrast, the deterrence effect acts like a reduction in marijuana prevalence, initially reducing casual use, then cascading to further reductions in both casual and compulsive use, which will continue beyond 2002. Relative to the baseline, these effects combine for a 25% reduction in compulsive use and a 20% reduction in casual use by 2002. Because of its direct impact on both compulsive and casual users, an increase in felony arrests of drug-law violators may be an effective (though costly) way to reduce cocaine prevalence.

Future scenario #4: The domestic seizure fraction for cocaine increases by 40% in 1992. This policy is less effective at reducing prevalence than the others described above because of the ability of importers to offset a significant portion of the seizures with additional imports and thereby minimize the effects on retail supply and price. Relative to the baseline, casual use is reduced 10% and compulsive use only 7% by 2002. Some policymakers may hope that increased seizures will increase the retail price enough to set in motion-- a vicious cycle reduced demand leading to reduced supply, increased distribution costs, and yet further

increases in price. The model suggests strongly, however, that increased seizures will not "burst the balloon" of the national cocaine market in this way.[1]

5. CONCLUSIONS

5.1 Policy Implications Based on the Prevalence Estimation Results

Determining the number of drug users is only the first step toward the eventual goal of reducing adverse consequences associated with drug use. In order to develop effective intervention strategies, research efforts need to be directed toward understanding risk factors associated with use, identifying and reaching individuals at risk, and determining the outcome of specific behavior modifications or interventions. The models developed in this project and their application results can be used as a basis for improving policy decisions on issues such as resource allocation and targeting intervention efforts more effectively.

For example, the results of synthetic estimation show that there are tremendous discrepancies between clients served in drug treatment programs and criminals apprehended by the criminal justice system. The differences in the estimated absolute numbers of treatment-served users and arrested users indicate a huge shortage in treatment capacity to meet the likely demand. The multiple-capture model supports this view and indicates that only about 4% of cocaine users are seen in the treatment. The dearth of cocaine users utilizing treatment suggests that the treatment system is not attracting the drug-using CJS population perhaps because of inappropriate treatment services or outreach efforts. The system dynamics model further suggests that a major expansion of treatment programs will substantially decrease compulsive use, as will increased drug-law arrests. On the other hand, increasing domestic seizure levels is not likely to achieve similar effects. Further investigation of the cost/benefit

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[1] Caulkins (1990) presents an elegant "ballon model" of illicit drug markets and explores its implications on both a national level and a local level.

of various interventions may assist in planning strategies for combating cocaine use and cocaine-related crime.

5.2 Data Improvement

Current data systems have been criticized on several grounds, including coverage, consistency, comparability, and so on (See Appendix I). With limited resources available, complete amelioration of all these data deficiencies is unlikely and probably unnecessary. What can be done and should be done is to ensure the comparability of data across sources, time, and geographical areas. Comparability means that definitions and inclusion criteria should be consistent, at least along some common dimensions, so that extent of overlap between data sources can be estimated. Comprehensiveness in coverage over time, groups, and geographic areas, although desirable, is costly. Alternatively, we could have a few less detailed, large-scale data systems that provide comprehensive coverage and several in-depth, small-scale data collection efforts to provide quality data. As long as comparability is maintained among these two levels of data systems, "corrective" measures from the small-scale systems can be used to project to large-scale systems. To achieve comparability among all applicable data series, a common core of questions should be established that can link these series in both a cross-sectional and longitudinal manner.

It is particularly important for smaller-scale data collection efforts to: 1) improve the sampling frames for "at risk" populations, 2) wherever possible, move from aggregate levels of data collection (such as the current UCR system) to incident-based reporting and provide a link from episodes to persons by utilizing a unique personal identifier that allows such linkage while maintaining requisite confidentiality, and 3) wherever possible, corroborate self-report or observer report instances of drug involvement with more objective measures involving collateral reports from records, informants, or biological tests. While such objective

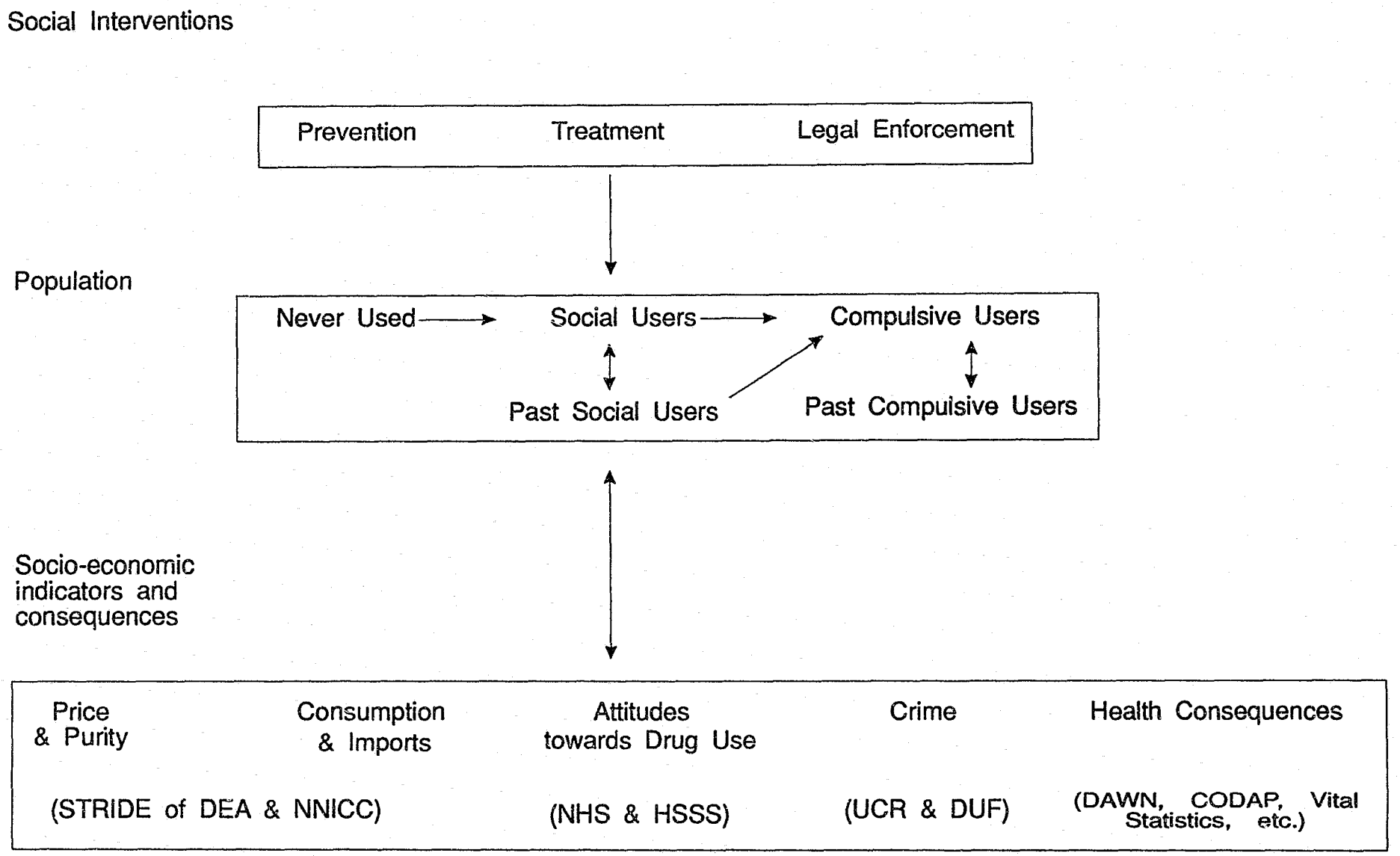
assessments may not be practical in a continuing data series, sufficiently frequent small-scale studies should be conducted so that "corrective," or weighted, measures can be calculated.

For all existing data series, emphasis on data quality assurance is essential. Technical and training assistance to those individuals gathering and collating the raw data would help ensure comparability of selection criteria, eliminate coding and omission errors, and as minimizing internal inconsistencies. Furthermore, careful training and monitoring of data gatherers to identify and specify the "drug relatedness" of the phenomena being described would further assure data quality in existing series. As a final consideration, reducing lengthy lag times between the collection of data and the dissemination of the derived findings would improve their utility in developing policy.

5.3 Multi-Method Approach

Currently there is no single estimation method that can adequately cover all aspects of concern, nor does it now seem that a single method can ever meet the various needs of different types of prevalence estimation. Since a complete enumeration of the entire user population is unrealistic, several methodologies that can compensate for and estimate from incomplete information will always be necessary. Using complementary methods, each focusing on different aspects of the phenomenon as demonstrated in this project, confidence in the resultant estimates is increased. It must be emphasized that any estimate derived by one particular method is the result of an interplay between theory, methodology, and empirical data. By understanding these interactions, the interpretation of specific application results from each methodology can be placed in the appropriate context. Even when different methods produce somewhat different estimates, which is understandable and should be expected, together they can provide ranges that set boundaries for policy decisions that determine reasonable resource allocations for the various needs of enforcement, treatment, and prevention.

Figure 1. A general description of the cocaine user populations and related influences relevant to the present study



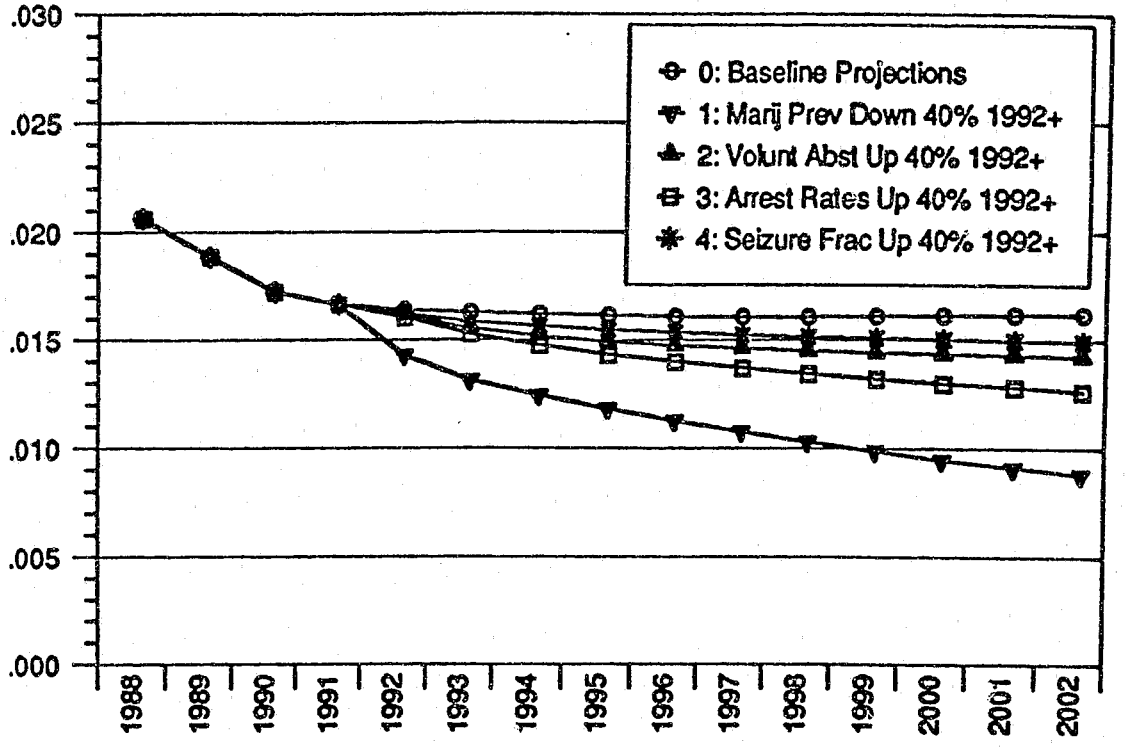


Figure 2. Past Month User Prevalence Fraction Simulated Under Alternative Future Scenarios

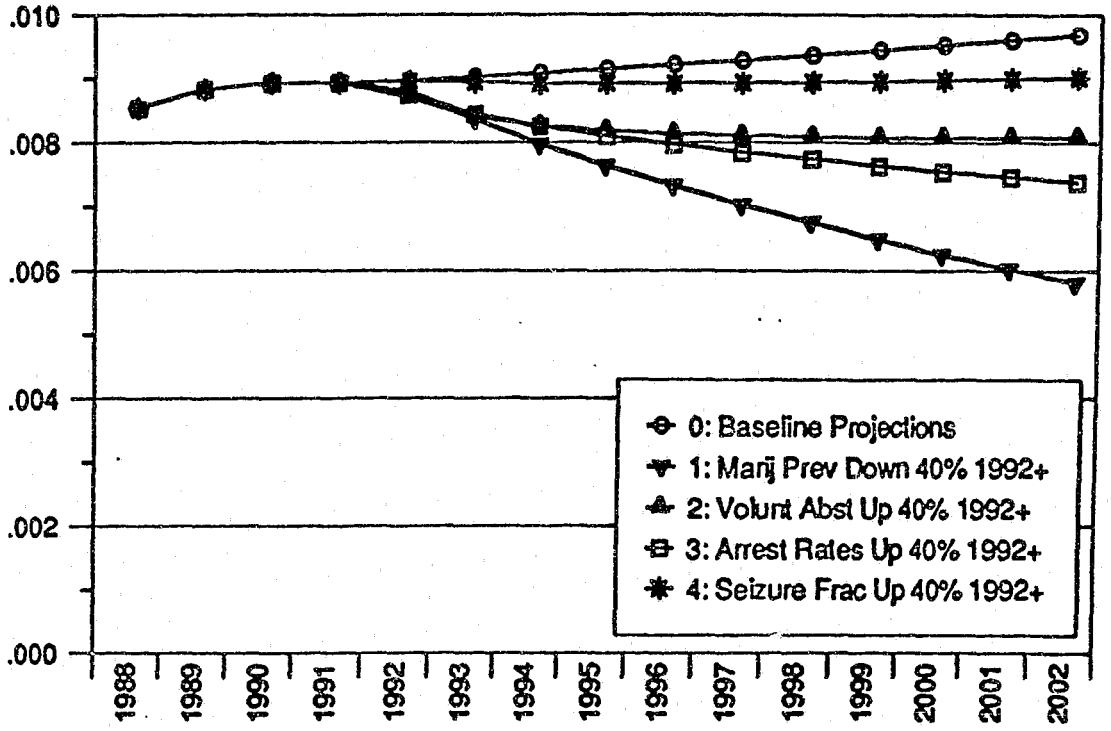
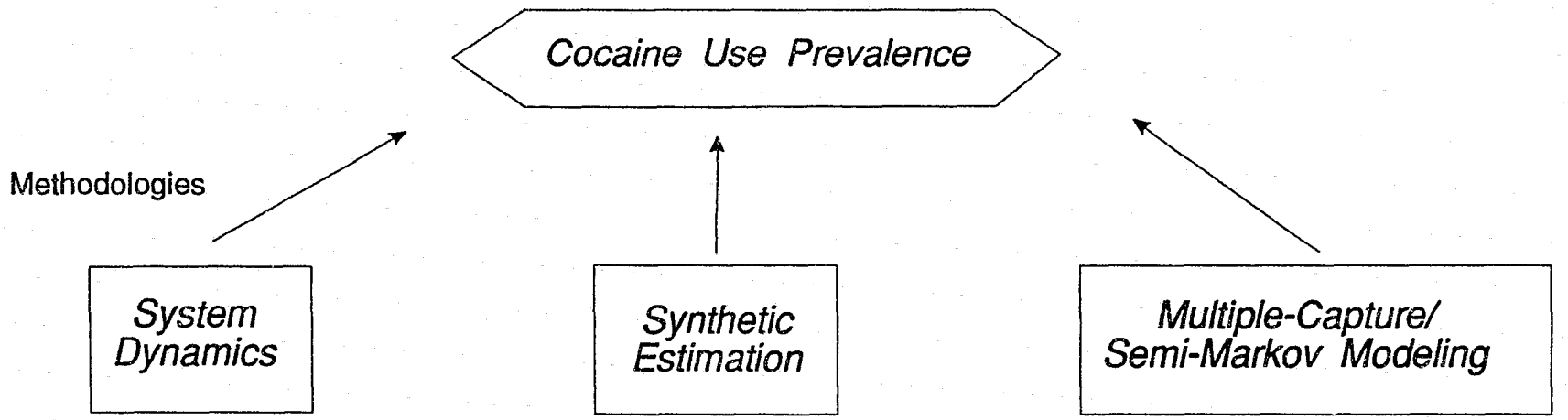


Figure 3. Compulsive User Prevalence Fraction Simulated Under Alternative Future Scenarios

Table 1. Cocaine prevalence estimation techniques: Strengths and weaknesses



	System Dynamics	Synthetic Estimation	Multiple-Capture/ Semi-Markov Modeling
Strength	Comprehensive description about the processes A general dynamic structure Full use of data sources Good forecasting properties	Requires little knowledge about the processes Relatively free from structural model Requires fewer data sources	Focus on minimal dynamic structure Statistically solid
Weakness	Overdetermined Difficult to validate	No structural properties Estimates dependent on high quality input	Does not use full data Models too simplified

TABLE 2. LOS ANGELES, 1989.
COCAINE USE.

	SAMPLE SIZE	COCAINE POSITIVE (%)	ARRESTEES	DRUG USING ARRESTEES	S. E.
VIOLENT CRIME					
MALE	171	39.49	58,949	23,281	
WHITE	39	15.38	14,979	2,304	865
BLACK	56	60.71	17,052	10,352	1,113
HISPANIC/ OTHER	76	39.47	26,918	10,625	1,509
FEMALE	51	43.71	7,259	3,173	
WHITE	13	30.77	2,114	650	271
BLACK	28	67.86	3,120	2,117	275
HISPANIC/ OTHER	10	20.00	2,025	405	256
INCOME GENERATING CRIME					
MALE	326	57.86	74,277	42,978	
WHITE	61	52.46	16,672	8,746	1,066
BLACK	138	78.26	24,314	19,028	854
HISPANIC/ OTHER	127	45.67	33,291	15,204	1,472
FEMALE	174	67.29	25,026	16,841	
WHITE	43	67.44	7,355	4,960	526
BLACK	91	80.22	9,393	7,535	392
HISPANIC/ OTHER	40	52.50	8,278	4,346	654
DRUG VIOLATIONS CRIME					
MALE	73	62.48	64,804	40,490	
WHITE	20	35.00	14,242	4,985	1,519
BLACK	9	88.89	21,130	18,782	2,213
HISPANIC/ OTHER	44	56.82	29,432	16,723	2,198
FEMALE	47	72.39	14,449	10,459	
WHITE	19	52.63	4,770	2,510	546
BLACK	17	82.35	5,594	4,607	517
HISPANIC/ OTHER	11	81.82	4,085	3,342	475
OTHER CRIME DUF IDENTIFIED					
MALE	58	38.39	16,635	6,386	
WHITE	21	28.57	5,172	1,478	510
BLACK	13	61.54	4,832	2,974	652
HISPANIC/ OTHER	24	29.17	6,631	1,934	615
FEMALE	18	59.00	3,028	1,787	
WHITE	8	75.00	1,085	814	166
BLACK	6	83.33	835	696	127
HISPANIC/ OTHER	4	25.00	1,108	277	240
OTHER CRIME DUF NON-IDENTIFIED					
MALE			155,502		
WHITE			47,618		
BLACK			20,081		
HISPANIC/ OTHER			87,803		
FEMALE			16,184		
WHITE			8,497		
BLACK			3,136		
HISPANIC/ OTHER			4,551		
TOTAL (Duf-Identified)	(918)	54.98	(264,427)	(145,395)	(4,833)

TABLE 3: Estimates of various categories of cocaine users

National Estimates (based on the systems dynamics model)

	1976	1980	1984	1988	1990
USED PAST MONTH	1.4 mill.	7.8 mill.	6.6 mill.	4.2 mill.	3.6 mill.
Compulsive, prefer Crack	0%	0%	10%	23%	36%
Compulsive, prefer Powder	20%	80%	15%	18%	16%
Casual, prefer Crack	0%	0%	5%	29%	28%
Casual, prefer Powder	80%	92%	79%	30%	20%
USED PAST YEAR	4.0 mill.	13.3 mill.	16.1 mill.	14.8 mill.	13.7 mill.
Compulsive, prefer Crack	0%	0%	1%	8%	12%
Compulsive, prefer Powder	8%	5%	7%	6%	5%
Casual, prefer Crack	0%	0%	3%	19%	24%
Casual, prefer Powder	92%	95%	90%	67%	59%

California Estimates (based on the multiple-capture model)

TREATMENT SUSCEPTIBLE POPULATION	1984	1985	1986	1987	1988	1989
	131,265	173,034	237,552	277,829	305,353	331,205

Los Angeles Estimates

TREATMENT SUSCEPTIBLE POPULATION (multiple-capture)	1984	1985	1986	1987	1988	1989
	46,566	70,013	94,835	104,450	107,491	100,594

CJS-INVOLVED POPULATION (synthetic estimation)	*Arrestees*	145,395
	Criminals	371,730