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*Improving Data and
Analysis to Support
National Drug Abuse
Policy — Main Report*

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1. INTRODUCTION

The Office of National Drug Control Policy (ONDCP) is required by its authorizing legislation to report on the overall status of the drug use problem in the nation, to develop a national drug control strategy, and to measure the effectiveness of that strategy. Neither ONDCP nor the nation is well served by the fragmented and untimely nature of existing drug data systems. Neither are federal and state policy agencies in the various individual sectors of drug control, e.g. health, justice, education. What has been lacking, in spite of substantial federal investment in data expansion efforts during the past few years, is a comprehensive, systematic, and coordinated approach to analyzing drug data problems and prospects for their improvement.

As the major federal consumer of drug indicator data, and the agency charged with coordination of drug control efforts, ONDCP is uniquely positioned to identify drug policy data requirements, undertake objective, critical review of the whole array of existing data, and marshal efforts toward greater coordination and integration of data acquisition efforts within and across federal agencies. This report is intended to support this kind of broad data improvement effort.

APPROACH

We take a different approach from prior drug data evaluation efforts that have focused on improvements needed for specific kinds of data, e.g. prevalence,² or specific surveys, e.g. the National Household Survey on Drug Abuse (NHSDA),³ or specific data collection methods, e.g., self-reports of drug use.⁴ We focus instead on the role of national drug problem indicators in support of decisionmaking about policy, identifying the kinds of data that rational policy decisionmaking demands. We point out, for example, that information about future drug problems rather than current prevalence is more

²Haaga and Reuter, 1991.

³General Accounting Office, 1993.

⁴Harrison, Haaga and Richards, 1993.

critical for developing drug control strategies. With an orientation toward the uses of data to support policy development and policy evaluation, we examine drug problem indicators from three perspectives: First, the current obstacles that limit the utility of existing indicators in support of policy decisionmaking; second, the untapped potential of existing indicators to have greater policy relevance when more creative analytic approaches are adopted; and third, what alternatives might be considered to begin to fill data gaps.

METHODS

Our interpretation of drug policy data needs is based on three sources of information about ONDCP policy responsibilities and data requirements and our own conceptualization of data necessary to support rational decisionmaking across national drug policy domains. Our sources of information included meetings and discussions with ONDCP officials who outlined their policy responsibilities and data needs; a review of the congressional legislation which authorized this policy agency and defined its policy responsibilities; and each of the annual ONDCP strategy documents.

As part of this project, we conducted numerous statistical analyses in attempts to address salient policy questions using existing data. These analyses, reported below, produced not only evidence of the greater potential of most indicators to contribute information to ongoing policy debates, but also information on the strengths and weaknesses of individual indicators that we also discuss below. Other analytic approaches and different variables and databases could be used in national drug policy analysis. Our purpose was solely to illustrate that more sophisticated analytic approaches, use of more of the data that often are underutilized, and different presentations of existing data, can result in enhanced policy utility for existing indicators.

Our exploratory analyses used only data sets on individual level drug use and drug problem indicators. Similar efforts could be undertaken to explore the policy utility of existing data on interventions, e.g. treatment services, drug markets and community level drug problem consequences, such as mortality and crime rates.

To support our discussion of the potential of alternative approaches to fill important data gaps, we reviewed the existing literature on public health surveillance systems and the scant literature on drug abuse surveillance systems.

ORGANIZATION OF THE REPORT

We begin in Section 2 with a brief review of the development of drug problem indicators over the past twenty years, focusing on the evolution of policy demands for data and the problems which limit the policy applicability of the indicators. In Section 3 we describe several analytic approaches with potential for enhancing the policy relevance of existing indicators. In Section 4 we discuss the potential of surveillance systems based on public health models as a possible alternative for understanding policy relevant populations not sufficiently described in existing surveys. Finally, we provide in Section 5 a conceptual model for use in analyzing drug data needs from a policy perspective and suggest that orienting data improvement efforts around the range of national policy domains and the data needs they produce will result in a greater role for drug problem indicators in supporting policy decisionmaking in the future.

2. HISTORY AND STATUS OF DRUG PROBLEM INDICATOR SYSTEMS

DEVELOPMENT OF DRUG INDICATORS

Over the past two decades various law enforcement, health, and other agencies have developed and supported the collection of data useful for monitoring drug and alcohol consumption in the nation.⁵ The major data acquisition systems designed specifically for monitoring the nation's drug problems and programs were designed and implemented by the National Institute on Drug Abuse (NIDA) in the early 1970s. Two, Monitoring the Future (MTF) and the National Household Survey on Drug Abuse (NHSDA), focused on estimating the prevalence of licit and illicit drug use in the nation. The NHSDA was designed to capture drug and alcohol use among the household population and Monitoring the Future was designed to capture prevalence separately for the high school senior sub-population. A third system, the Drug Abuse Warning Network (DAWN), designed in conjunction with DEA in the early 70s, was meant to identify substances causing emergency medical consequences and deaths and to detect new substances of abuse producing such consequences. More broadly, it was designed with the objective of "monitoring drug abuse patterns and trends" and "to assess health hazards associated with drug abuse." (NIDA, DAWN report). A fourth system, the Client Oriented Drug Abuse Profile (CODAP), was designed to describe the treatment client population.

NIDA also sponsored the collection of drug data in surveys conducted for other purposes and sponsored mainly by other agencies. The National Youth Survey and the National Longitudinal Survey of Labor Market Experience Youth Cohort (NLS-Y) are examples of this practice.

In the justice sector, a different approach dominated the development of drug problem indicators. Usually, existing monitoring systems for reporting crimes and arrests (Uniform Crime Reports [UCR]), adjudications and convictions (Offender Based Transaction Statistics

⁵For a detailed description of existing federally sponsored databases see Ebener, Feldman and Fitzgerald, 1993.

[OBTS] and the Federal Justice Statistics Program [FJSP]), captured the incidence of drug arrests and convictions among the penal codes included in these systems. The Uniform Crime Reporting system was modified in an attempt to capture the involvement of drugs in homicide incidents. Surveys of criminal justice inmate populations were also modified over time to capture data on drug use history and problems of inmates, and correctional facility surveys added items to identify treatment capacity and utilization in correctional facilities. The Drug Use Forecasting (DUF) system funded since 1987 by the National Institute of Justice is really the only criminal justice database designed solely for monitoring drug use among offenders. The DEA has long funded its own data systems for monitoring the price and purity of illicit drugs.

Other national health agencies, e.g. the Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS) include questions about drug use in their epidemiological and health services monitoring systems.

Each sponsor, with its unique mission, has had its own purpose for the data it collects, its own target population(s) of interest, and different methods and measures for studying the behavior of interest. For many years, no agency had responsibility for coordinating the development of comprehensive information to describe the drug and alcohol abuse problems of the nation, for setting data standards, or for synthesizing results from different efforts. Gaps and overlaps resulting from the fragmentation of efforts were never targeted for elimination and no systematic effort was made to identify what core data were necessary for a comprehensive description of drug and alcohol problems. Standardization of measures was achievable only within a single agency's databases. Not surprisingly, different and often seemingly inconsistent, findings sometimes emerge when attempts are made to compare results across these unrelated indicator systems. In addition to the problems arising from lack of coordination of federal substance abuse data, the diverse data collection systems provided information at infrequent intervals. Long lag times between data collection and data reporting precluded their usefulness for assessing current trends and contributing to policy development.

Major changes in drug abuse funding levels in the early 1980s resulted in the demise and degeneration of some of the early drug data systems sponsored by NIDA. Others, like NHSDA and MTF, continued for many years to collect basically the same data on prevalence of use. Periodically, reports using univariate and bivariate statistics were published for new waves of data and little further demand was placed on the data. Indeed, since none of the data was in the public domain (except the cross-sectional sample from MTF), few ever used data.

POLICY AGENCY CREATES NEW DEMANDS ON EXISTING DATA

However, in the mid to late 1980s new demands began to be placed on these core data systems. For example, the Anti Drug Abuse Acts of 1985 and 1988 mandated improved information on the size of the drug abuse problem and the effectiveness of responses to the problem. With the creation of the ONDCP (and similar state level agencies), for the first time an agency charged with overall policy responsibilities became a consumer of the existing data. Given the, by then, historical antecedents of the various systems, it is not surprising that the new users found the data systems inadequate for supporting emerging national and local policy needs. After all, the systems had been developed at a time when no data were available and merely monitoring patterns of use and consequences were admirable objectives for the new systems.

The creation of the ONDCP by the Congress in 1988 and its mandate to develop a national drug control strategy with measurable objectives placed very different demands on existing data systems, created initially for monitoring or internal management purposes. ONDCP has been forced to rely on existing systems which have sometimes proved, in addition to being untimely, to be inadequate for addressing current policy issues, difficult to interpret, and impossible to use in forward-looking analysis.

With changing policy concerns and Congressional mandates to produce quantifiable measures of the success of its strategy, ONDCP led the way in using the existing data in new ways. For example, DAWN became a system that was tracked closely from quarter to quarter for evidence of gains in the "war on drugs." The Institute of Medicine used the

National Household Survey to estimate need in the general population for drug treatment. NDATUS was turned to for information about the gap between demand and availability of services.

RECENT EXPANSION OF INDICATORS

Obvious problems and inadequacies of the data systems for supporting policy decisionmaking⁶ in the 1990's produced several major changes and redesigns that have affected each of these ongoing surveys over the past few years. For example, to produce timelier data, the NHSDA became an annual survey and expanded from a sample of 8,000, costing approximately \$1.4 million to administer annually, to a sample of over 30,000 costing approximately \$12 million. This modification was partly in response to congressional demands for information about the hard-core drug problems in urban areas and use in high-risk populations.

The DAWN hospital sample was redesigned over a period of years in the late 1980s so that national estimates could be made from the data. Monitoring the Future now includes additional grade levels, and a sample of school dropouts. A survey of prevalence of drug use among pregnant women, another sub-population of present policy interest, is in the field and a survey of youth risk behaviors including alcohol and drug use has been launched by CDC. AIDS-related research has generated data on several thousand injection drug users (the National AIDS Demonstration Research Project [NADR]) in selected sites around the country. Other efforts are underway to develop data on hard-core drug users, borrowing from some of the NADR approaches to this hard to reach population. In addition, the National Institute of Justice introduced (and has already expanded several times) a metropolitan area based survey of drug use among arrestees, the Drug Use Forecasting (DUF) system.

While former prevalence-focused indicators have been greatly modified, entirely new efforts have been introduced to provide expanded information about the substance abuse prevention and treatment services system. These include the Drug Services Research Survey and the Client Treatment Data System (replacing the earlier CODAP system, dismantled

⁶Haaga and Reuter, 1991; General Accounting Office, 1993.

when federal funding was eliminated). A new treatment outcomes survey (DATOS), similar to the 1980 Treatment Outcome Prospective Study conducted in 1979-1981, is also collecting data..

At the same time, the Office of Treatment Improvement/Center for Substance Abuse Treatment (OTI/CSAT) has been urging states to develop data systems for improving the rationale for resource allocation and demonstrating the effectiveness of intervention efforts. Most of this work to date has focused on needs assessment for treatment proposing different methodologies and different measures for collecting information about drug problems in the household population than those used in the NIDA/OAS data programs. Future efforts will be directed toward prevention needs assessment.

LESSONS FOR FUTURE DATA IMPROVEMENT EFFORTS

Several important lessons emerge from this relatively brief history of federal drug data development efforts that are worth considering in the course of designing and implementing future data improvement efforts.

Systems Should be Designed to Accommodate Changing Information Needs

As noted above, the policy purposes for which drug use data are needed have been changing and evolving, driven by the changing and evolving nature of the drug problem and improved understanding of its complexities. At the time when most of the drug use monitoring surveys were designed, the greatest policy concern was with use of drugs by young people in the general population - hence a household survey and a high school senior survey. By the mid-80s, when drug use in the general population appeared to decline and the crack epidemic and the associated increases in crime and violence associated with urban drug problems emerged, attention began to focus on the hard-core drug user population and the gap in data for this segment of the drug using population became evident, though policy shifted only much later. The question for future improvement efforts is how to anticipate changing needs for data so that they can be available in advance of crisis demand for them. Developing a conceptual model of the range of behaviors involved in drug use in the behaviors that policy aims to affect might help to prioritize policy

data needs. Placing existing data on the model would illustrate data gaps to be filled and redundancies that might be candidates for elimination or opportunities for validation.

Systems Should be Designed to Accommodate Varying Funding Levels

In the past, federal funding for drug data rose and declined with national interest in the substance abuse problem. In the past few years funding has tripled for a number of different data collection efforts. But as in the past, this level of funding is unlikely to be sustained. When the decline occurs, the huge expense of the data systems is unlikely to be born by state and local government, and many series may be eliminated, or at best, severely cut back. Since this is an expected cycle, it seems that data systems planning for national data should involve the development of minimum core data sets and long-term funding to sustain them. If the data they gather are of utility to state and local policymakers their chances of continuation after federal funds are withdrawn are much greater.

We may well be entering a period of reduced funding and perhaps a second cycle of demise of ongoing data systems. In preparing for data improvements it may be wise to begin with a systematic review by each federal agency of the substance abuse data systems it funds to identify core systems that deserve maintenance and enhancement for the long term.

Systems Should Be Evaluated for Needed Modification Over Time

In addition to changing demands and resources for data collection, the context of the data, and methods by which they are collected, have frequently changed since the time when many of the major systems were first developed. For example, with the emergence of AIDS and the dwindling supply of primary health care providers, the profile of emergency room patients in major metropolitan areas looks quite different today than it did when DAWN was established.⁷ The change in utilization patterns may significantly affect DAWN's ability to meet some or all of its objectives. While its hospital sample was recently redesigned, no study was commissioned to evaluate the overall design.

⁷Rhee, K.J., et al., 1991.

Data collection techniques have also undergone substantial change since the initiation of most of the original drug monitoring systems. As an example, a myriad of advanced data collection systems have been introduced in hospitals to link patient information from several sources including billing, medical records and laboratory reports to provide more comprehensive information on diagnoses, treatment and costs. Rodewald, et al. describe a powerful but efficient and economic way to link existing hospital databases for improving clinical information.⁸ Efforts to integrate substance abuse monitoring with other purposes for these systems might offer an enriched, alternative data collection method to that of screening triage reports and reviewing emergency room charts that contain minimal information used by DAWN since it was first developed.

Telephone surveys have largely replaced in person interviewing for most social surveys, due to the rising costs and non-response problems associated with personal interviewing. While NIDA conducted tests of telephone survey approaches⁹ and found significant rates of underreporting biased the prevalence estimates, CSAT, a SAMHSA agency, has funded many states to carry out household telephone surveys. NIDA also conducted and published other methodological studies related to measurement and self-report data collection¹⁰ that have resulted in numerous modifications of the survey aimed at addressing problems that users have identified with the database. Other problems, such as the need for validation of reported drug use remain. While the health agencies responsible for drug data have had advisors and data users consult on various surveys, there has never been an independent study to evaluate the purposes, design and implementation of the DHHS applied data systems. After 20 years, such a review, like the National Academy of Sciences review of the National Crime Survey, might result in significant redesign recommendations to address ongoing problems and meet future demands for the data.

⁸Rodewald, Wrenn and Slovis, 1992.

⁹Gfroerer and Hughes, 1992

¹⁰Turner, Charles F., Judith T. Lessler and Joseph C. Gfroerer, 1992.

Newer data systems by contrast, have taken advantage of advances in monitoring drug use, such as urine testing. The DUF program uses this validation of self-report in its data collection, indeed, the self-reports themselves are rarely given attention. DUF also was designed with a core battery of items for use in all sites, but allows items to be added or changed to meet local and national need for ad hoc data. By collecting and processing data quarterly, DUF can produce timely reporting of results. A system for efficient online transmission of data from the field to its processing point speeds data processing. NIJ did commission a DUF evaluation study within the first five years of DUF data collection.

Coordination across agencies and data systems should be built into the design of indicator systems

As noted earlier, several of new data systems have been developed over the past five years. Others can be anticipated in the future. In the past, the lack of coordination among agencies has meant that findings across studies cannot be integrated, differences cannot be explained, and duplications and redundancies persist. Opportunities for enhancing cooperation among agencies should be developed as part of any drug data improvement project, to focus on identifying common data needs, developing data standards for use in measurement and field operations; defining core data sets, sharing the cost of data acquisition and analysis, and exchanging data across agencies to expand their utilization.

Systems Should Be Designed to Produce Timely Output

Timeliness of data on trends is of high priority for reporting the current status of the drug problem, forecasting trends, planning, and budgeting. Two problems currently limit the timeliness of data available for planning. First, some existing monitoring systems are driven by past behavior and drug use patterns, rather than capturing contemporary or leading indicators of drug use. Second, even those that capture contemporary behavior are often slow to process and report findings. Both situations create problems for forward looking policy analysis.

3. ENHANCING POLICY RELEVANCE OF EXISTING DATA

INTRODUCTION

While redesigning and modifying drug data systems can involve long-term efforts, there are short term benefits that might be obtained simply from making greater use of the bounty of existing data on drug abuse. In this section we investigate the potential of data from the existing indicator systems for developing more comprehensive analysis for supporting demand reduction policy decisionmaking. Investigation for supporting supply reduction policy was outside the scope of this study, but certainly could be pursued using a similar approach.

The currently available drug use data have traditionally served a very limited policy role -- largely restricted to providing policy makers with estimates of prevalence of use of various substances in the general population over time. This is not especially useful for such tasks as determining resource levels and allocations, evaluating policies and planning, and developing effective and efficient strategies. Broad measures of prevalence describe the status of drug use, they do not inform the policy maker on how to change that status.

There are many reasons (discussed in Section 2) why the existing data have been used primarily as measures of the general status of drug use. Probably the most important is that the indicators were not designed for policy purposes; they were designed to simply measure current use. This presents certain methodological challenges to the analyst approaching the data for the first time. However, more data are collected than are typically used and most of the current data sources can be manipulated to provide information which is more useful than reporting of numbers of users alone. For example, the current data, while mostly cross-sectional, can support analysis of drug use dynamics including initiation and continuation of use. Analyses of dynamics could foster the development of forecasting tools. Also, information not typically reported, could be used to monitor different use patterns and to plan and evaluate policy interventions targeted at changing them.

Exploring existing data also identifies limitations that are sometimes overlooked. As discussed in Section 2 the development of indicators in the past focused on the prevalence of use in the general population, both because the policy concern resided with this group and because this population is easier to study than some of the critical sub-populations. While a wealth of data exist for youth, the existing data are very limited for informing policy in regard to seriously dysfunctional users and others of policy importance like pregnant users. These groups are excluded from the population captured in the major databases, or their representation in them is difficult to assess.

The following sections of this chapter discuss several examples of approaches to using the currently available data to address policy relevant questions, including:

1. An analysis of drug use dynamics that forecasting models might be developed using NHSDA and other databases which support analysis of initiation and persistence in use.
2. An analysis of the heterogeneity of use concealed in the broad general prevalence categories reported by NHSDA. Different patterns of use are identified using data on expenditures, consumption and frequency of use.
3. Comparative analysis across data sources for youth and pregnant users. These analyses shed light on important aspects of sampling, data collection design and methods that limit integration of results.
4. Analysis of need for treatment among users in the household population.

These analyses demonstrate more useful analytical approaches to the data, the potential for using underutilized measures and databases and combining databases for comparative analysis. They also demonstrate limitations of the databases and offer some lessons that are important to consider in future data improvement efforts. Each analysis is documented in an appendix to this report.

UNDERSTANDING DYNAMICS OF USE CAN IMPROVE PLANNING TOOLS

Historically very little has been written about trends in initiation. Yet during the course of a drug use epidemic there will be major changes in rates of initiation that cannot be observed from prevalence data.

While knowledge of prevalence levels is clearly crucial for useful policy formulation and implementation, it provides information about only a single facet of what is in fact a constantly changing process. For example, while a downward trend appears in the more recent prevalence estimates of marijuana use, the sources of that decrease are not indicated. It might be that heavier users of the drug are reducing their intake to more sporadic and lighter levels (e.g., bimonthly instead of monthly), or that earlier desistance from use is occurring among current users, or initiation into use is declining, or that some combination of these processes is reflected in the prevalence figure presented.

The ability to incorporate the dynamics of such movements and populations is relevant to the understanding and anticipation of trends over time. It also has implications for developing strategies for law enforcement, provisions of treatment for users, and appropriate targeting of prevention programs. Better policy planning can result from a better understanding of the current stage of a drug epidemic and the likely direction of future trends. For example, where initiation has declined but desistance is low, it might be appropriate to direct greater resources toward treatment.

Essentially any of 9 or 10 databases that contain information on year of first use or age of first use and current age could be used to analyze initiation. In our analysis (reported in detail in Appendix A), we calculated and compared initiation rates into marijuana and cocaine use over time, using both the NHSDA and data from MTF. In conjunction with these analyses we also examine prevalence rates and rates of retention or persistence in drug using behavior for recent initiates and other users. We present examples of useful potential short and medium range forecasting tools using these data systems and discuss alternative dynamics models.

To further analysis of drug use dynamics in the cross sectional surveys it would also be useful to know when former users last used. An additional item about date quit or last used would make calculations of desistance from use possible.

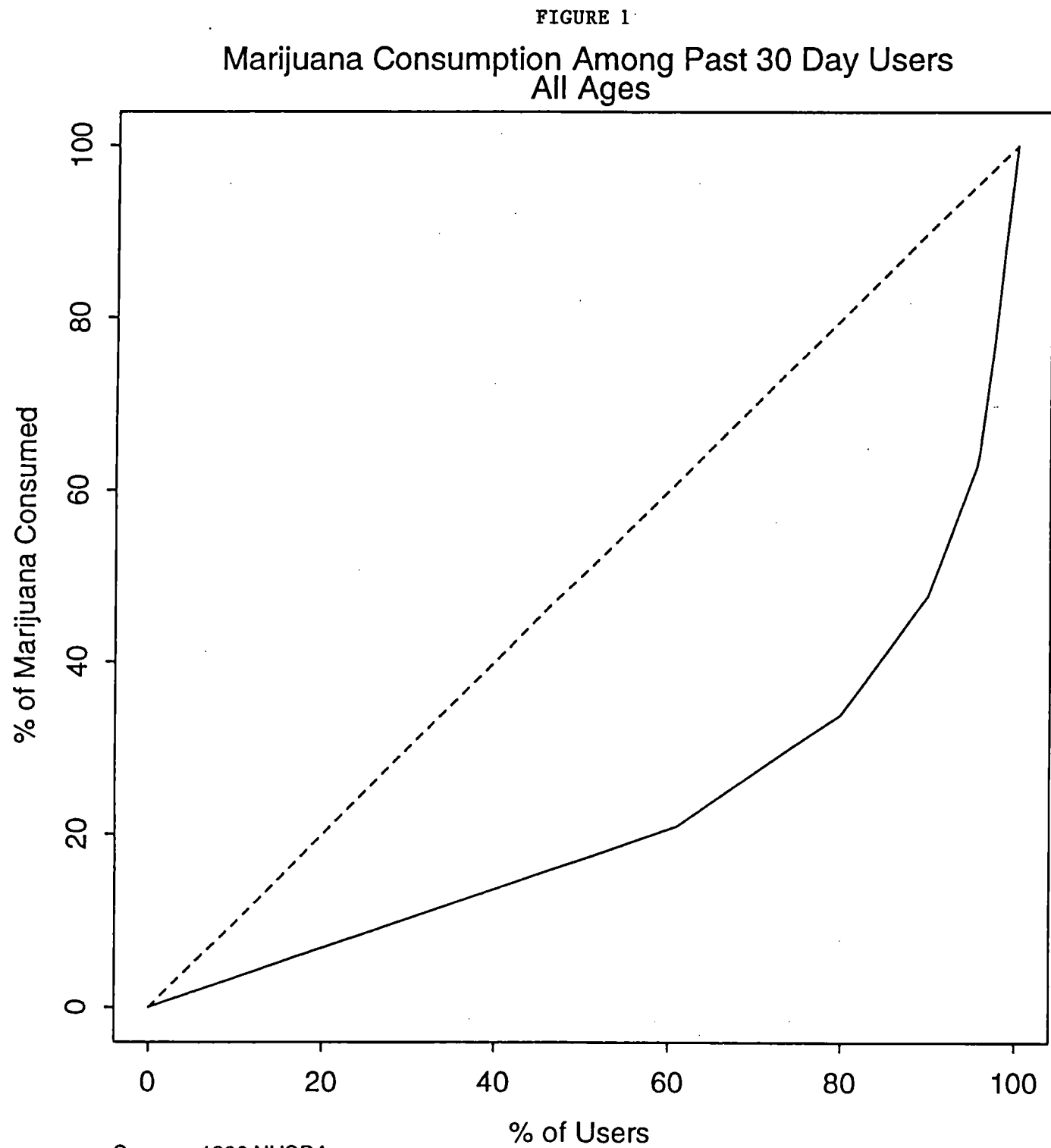
HETEROGENEITY AMONG CURRENT USERS CAN BE MASKED BY PREVALENCE

Detailed analysis of the characteristics and drug use behavior of recent users demonstrates great heterogeneity within this group. While trends in the number of current users are tracked closely, little use has been made of all the other information collected about these users. Using these data examined changes in the composition of this group over time, and variation in use patterns within the group. For example, the survey contains data regarding variation among current users in consumption; frequency of use; the proportion of new users versus long term users; and how the proportions are changing. Data for supporting this analysis were long collected but have received little attention in the past.¹¹ Appendix B describes our analysis of the heterogeneity among 30 day users surveyed in NHSDA and MTF.

That analysis shows that quantities consumed among 30 day users are relatively low and that the majority of users account for only a slight amount of total quantity consumed. These results confirm other findings that the household population and in school population are dominated by relatively casual users and that among users who can be identified in these populations the majority of the problems are associated with a minority of the individuals. The Lorenz curve shown in Figure 2 illustrates the tendency toward lighter use among the majority of the population. Sixty percent of the past 30 day users of marijuana account for only 20 percent of the marijuana consumed by all users. Similar patterns were found among various age groups and for different substances.

A classification scheme for distinguishing heavy and light users is given. Accurate evaluation of programs requires that use within each group be measured.

¹¹Some variables of particular interest, having proved difficult to measure, have since been dropped from the NHSDA.



As data on consumption, expenditures and frequency of use have a policy utility in sorting current users into various utilization categories that can be monitored for particular policy purposes, the measures to support these analyses should be improved. Responses are very clustered and we believe that the response categories provided may be influencing reporting. Open-ended items might make it easier for respondents to report amounts consumed, but then item coding would become necessary. Better information on frequency of use and expenditures would help to validate the consumption responses and further classification by use patterns. The levels of inconsistent reporting of use behavior seem quite high,¹² suggesting that respondents find it difficult to proceed through the NHSDA response sheets on their own. While the response sheets and self administration have proved in methodological studies to enhance self-reporting,¹³ confusion or misunderstanding by the respondent can produce other data problems.

ESTIMATING DRUG PROBLEMS AMONG SPECIAL POPULATIONS

Several sub-populations are of special interest to policy makers because of the large costs and high risks associated with their problem drug use. Such groups include injection drug users, offenders, pregnant women and adolescents. Yet the drug using behavior within some of these groups can be very difficult to study and as a result some are not well represented among the drug indicator systems. This is often because they are found so infrequently among the populations surveyed, such as households. When opportunities do arise to capture such groups it is usually from only a selected sub-set of the population, like injection drug users in treatment or pregnant women receiving prenatal care. For other special populations, such as youth, a myriad of indicators exist, and comparisons among similarly selected populations on age, and gender is relatively easy. Whether the group is well or sparingly described by the data sources, comparisons across sources can be difficult to make and more difficult to interpret.

¹²General Accounting Office, 1993

¹³Turner, Lessler and Devore, 1992.

The following sections describe the problems of estimating drug use and consequences in special populations, using multiple data sources.

Pregnant Users

Pregnant women are an especially important target group for drug abuse interventions. Federal Substance Abuse Block Grants regulations require a set-aside of 20 percent of resources for services for pregnant women. Despite the known health risks that a pregnant woman's use poses, and the efforts to target resources to meet needs for services, very little is known about the extent of substance abuse and harms resulting from substance abuse in this population. To make more meaningful resource allocations, policy makers must know the extent of the problem. Hence, any measure of use for pregnant women might be helpful.

But estimates often derive from anonymous urine testing done in the course of prenatal treatment or at the time of delivery. Often only some women are screened for the presence of drugs. Even when random samples of the entire population are selected, there is usually very little information about the user and indication of the presence of a drug doesn't provide information about drug use history or current use patterns. These drug tests, however, have sometimes found significant levels of drug exposure and heightened concern about substance abuse in this group. Survey data have been limited to those from the National Maternal and Infant Health Survey (NMIHS). This survey provides more detail on risk factors and pregnancy outcomes and also on changes in women's drug using behavior when they discover that they are pregnant. Comparing these data with survey data on drug use among child bearing age women can shed further light on potential behavior change. The analysis we conducted is documented in Appendix C.

In our analysis we compare prevalence estimates of drug and alcohol use between the NMIHS and NHSDA. For alcohol, marijuana and cocaine the rates, not surprisingly, were significantly lower in the NMIHS sample across all age and racial groups. The numbers across the two surveys are difficult to compare because of method differences, and because the NMIHS rate is not purely a use during pregnancy rate (the survey used a

window period of 12 months before delivery). Nonetheless, these numbers contribute an additional piece of information to the work of estimating substance abuse problems in this population.

The inability to match NHSDA and NMIHS respondents on pregnancy status could be amended by making a simple addition to the NHSDA questionnaire, to ask female respondents of childbearing age about pregnancies and child births during the past 12 months. With this information in the NHSDA comparison between pregnant and non-pregnant would not be confounded by the effect of different data collection methods which exists between NHSDA and NMIHS. Further analysis could be done using NMIHS rates to calibrate the NHSDA rate for child bearing age women. Finally, information in the NMIHS about changes in drug use behavior after learning about pregnancy deserve further analysis to identify the characteristics of users who change their behavior and those who do not after learning of their pregnancy. Substantial improvements in information campaigns might be made based on this kind of analysis.

Adolescents

Use among adolescents is troubling because of its toll on our future. When young people turn to alcohol and other drugs they become involved in risky behavior which can lead to diminished productivity throughout their life, a criminal record and maybe even death. Again there is strong commitment among policy makers to reduce drug use among this population. There is considerable information about drug use among American's youth available. The analysis we conducted reviewed those various sources of data, identifying similarities and difference among them in populations surveyed and data collection methods used. Our analysis reveals that while overall trends in prevalence rates have been in the same direction across all the studies, there are significant differences in measured rates, especially for heavy and current alcohol abuse.

We conducted a comparative analysis of four datasets - the High School Senior Survey, also known as Monitoring the Future (MTF); the National Household Survey of Drug Abuse (NHSDA); the national-level data

component of the Youth Risk Behavioral Survey (YRBS); and the Partnership Attitude Tracking Survey (PATs) of the Partnership for a Drug-Free America (see Appendix D).

As shown in Table 1, we found substantial variation in levels of reported drug use across the surveys. We believe the differences result from variation in sampling frames, measurement differences, questionnaire context and data collection method. For example, the prevalence figures reported in the YRBS and MTF for lifetime use are essentially identical when taking sampling variation into account. On the other hand, the NHSDA figures are lower in almost every instance, especially in the case of alcohol use. We hypothesize that this is a "mode of administration" effect, in that MTF and YRBS are school-based surveys while the NHSDA relies on in-home interviews.

Also of interest, however, are differences between MTF and YRBS, which is consistently higher across all measures and is significantly higher in its estimate of current alcohol and heavy alcohol use. These differences could be explained by significant differences in the two questionnaires used in the different school-based surveys. The drug questions in the YRBS are only one of a series of risk behaviors that the survey asks about and are perhaps less threatening than they are when asked in isolation.

Table 1
Prevalence of Alcohol and Illicit Drug Use Among Adolescents
1990 Data from MTF, the YRBS and NHSDA
(Entries are percentages)

	Alcohol			Marijuana		Cocaine	
	LIFE	CURR	HVY	LIFE	CURR	LIFE	CURR
MTF (n=15,200)	89.5	57.1	32.2	40.7	14.9	9.4	1.9
YRBS (n=2,908)	92.4	65.6	44.0	42.2	18.5	9.3	2.3
NHSDA							
All*	75.4	43.5	NA	33.2	10.2	6.8	0.7
In school	74.3	40.3	NA	29.4	11.6	5.5	0.5
Not in school	80.3	54.1	NA	45.7	6.4	10.8	1.3

* The weighted NHSDA data includes members of the general population aged 17-18; that is, both students and dropouts are included.

In spite of the large variation in absolute prevalence levels observed in these numbers, the measured trends in use across drugs and over time are much more consistent. All three sources confirm that a large majority of high school youth have used alcohol in their lifetimes, with substantial numbers reporting heavy use. Large numbers (between 30 and 40 percent) have initiated marijuana use, and a sizable number (between 6 and 10 percent) have used cocaine at least once. With regard to trends over time, lifetime use for all drugs is reported at higher levels than use in the past 30 days, and all four of the datasets we examined show a significant decrease from the high prevalence levels observed in 1985.

While our comparisons reveal how prevalence estimates are possibly affected by sampling frame, time of year in which a survey is administered, questionnaire and mode of administration (e.g., home vs. school vs. shopping mall, personal interview vs. anonymous survey

response), and choice of population to be sampled, they also underscore the importance of using multiple data sources to study policy issues, in this case validating and confirming observed trends of decreasing drug use within the adolescent population, while pointing out the importance of considering sample and method differences.

POSSIBLE SHORTCOMINGS OF HOUSEHOLD SAMPLES FOR ESTIMATING NEED FOR PUBLIC SECTOR TREATMENT

Treatment is widely considered the most important tool for reducing use among dependent and abusive drug users. There are large social costs associated with abuse and dependent drug use. These costs include crime, lost productivity, health care and the spread of infectious diseases such as AIDS. Because of these costs, governments have supported treatment for drug abusers for at least the last 30 years. Policy makers need to know how many people need treatment and how many public resources are necessary to treat these people.

Federal block grant regulations require that states provide estimates of treatment needs within their general population. Unfortunately, suitable indicators of such needs often do not exist.

Some analysts have turned to household surveys as a basis for estimating need for publicly funded drug treatment. The Center for Substance Abuse Treatment, which is assisting states to meet federal data reporting requirements, has encouraged many states to develop their own household surveys. However, in examining the NHSDA data we found that the vast majority of drug abusers identified as being "clearly in need of treatment" or drug dependent are not likely candidates for receiving publicly supported treatment.

Drug dependency does not necessarily translate into a policy-relevant indicator of need for treatment, especially public treatment. According to guidelines suggested by the Institute of Medicine, publicly supported treatment is justified when the treatment will considerably reduce the social costs of an individual's drug abuse or when the individual cannot afford treatment. By this criteria, any indicator of need for public treatment must not only identify drug dependence but must also demonstrate that the dependent users inflict high social costs or are uninsured and/or too destitute to afford private treatment.

It is widely recognized that some drugs result in higher social costs than others. Heroin and other opiates are typically associated with significant social costs. The same is true for heavy cocaine use. On the other hand, marijuana use is generally not associated with large social costs.

According to the findings of the 1990 NHSDA, 13 percent of the household population used illicit drugs in the 12 months preceding the survey. However, nearly half of all those who used drugs used only marijuana. And even among those who used cocaine, heroin, and psychotherapeutics, most used only marijuana on a weekly basis (see Figure 2).

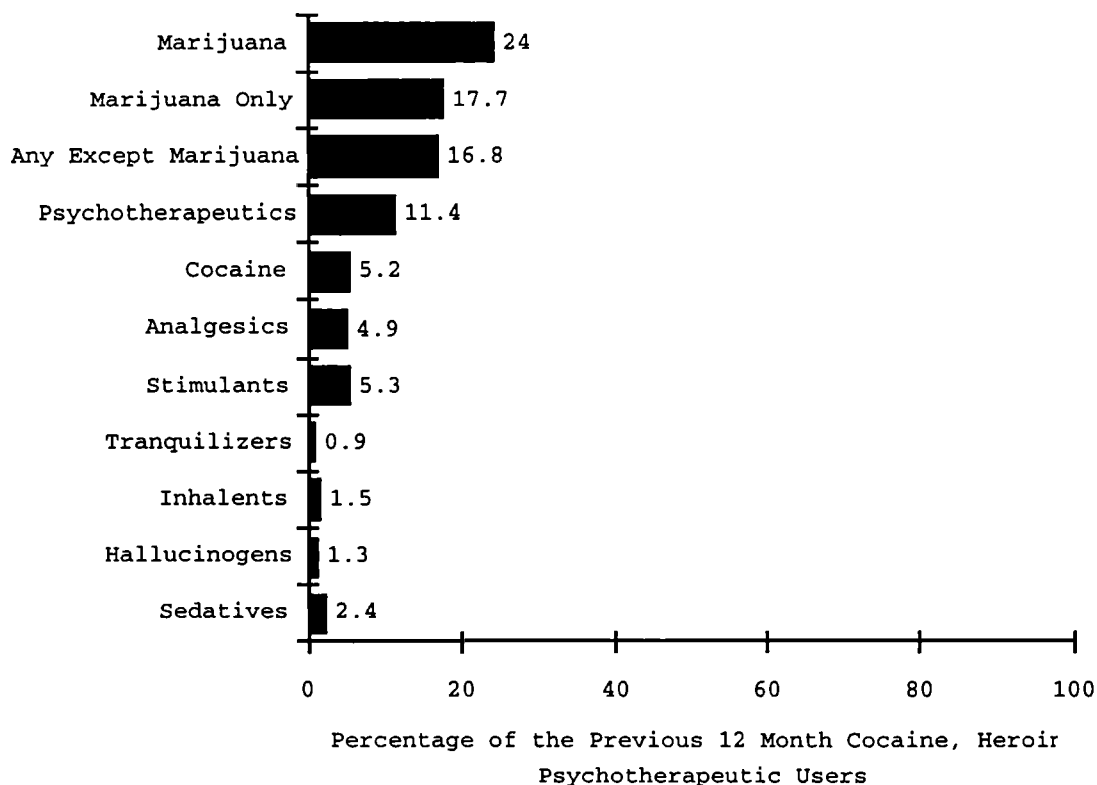


Fig. 2-Percentage of Previous 12 Month Cocaine, Heroin or Psychotherapeutic Users Using Various Substances Weekly

In identifying those in need of treatment we found that nearly two thirds of the clearly in need group abused only marijuana and alcohol. When we compared this behavior with that of a group of clients actually

receiving treatment, we found just the opposite -- about two thirds of the treatment clients were using the more serious drugs, such as cocaine and heroin.

We also found a difference in the socioeconomic characteristics of the two groups. Although those clearly in need of treatment tended to be poorer than the average member of the NHSDA household, the majority were far from destitute. Most were high school graduates and employed. Only one third did not graduate from high school and only 18 percent of this group was unemployed. In contrast, over 75 percent of the treatment clients were unemployed.

It would thus appear that only a small fraction of the drug users identified in the survey fit the profile of those who receive publicly supported treatment, demonstrating that household samples are inadequate for identifying need for public sector treatment resources. This analysis is reported in detail in Appendix E.

EVALUATING THE DRUG ABUSE WARNING NETWORK (DAWN)

DAWN data are collected from a large sample of emergency rooms and medical examiners, but the information DAWN contains does not come from surveys of patients or results of toxicology lab tests. Rather, data on drug related episodes in the emergency room (ER) are usually generated from retrospective review of emergency department charts. In some hospitals inpatient records are used instead of emergency department charts. Identification of drug-related episodes depends entirely on what is contained in the document reviewed by a DAWN coder.

In 1988 the sample of ERs was redesigned from the opportunistic sample to which the system had degenerated over the years to one that allows estimation of the total number of drug related visits to ERs in a metropolitan area or in the nation. A number of alternative approaches to collection of data, such as screens of blood or urine of a random sample of patients within each facility might be options worth considering to improve the rate at which DAWN captures drug-related ER episodes. Although efforts to validate DAWN at individual facilities have indicated substantial undercounting by DAWN the basic data collection method remained unchanged at the time of the sample redesign.

Several of the original objectives for DAWN may now be served better by other indicator systems. For example, studies of IVDUs and chronic crack users as part of the NADR Project provide information on the health hazards associated with drug abuse that is far richer than what DAWN provides. In addition, systems like the National Poison Control Index might do a better job of identifying new substances of abuse than DAWN. Improvements in hospital based information systems that link clinical, laboratory and financial records might provide much more detail about drug related emergency room visits than does DAWN.¹⁴

DAWN has often been used as an indicator of hard core drug use. However, there is no empirical evidence to support that utilization. The relationship between DAWN trends and trends in heavy use in DAWN communities has never been examined. The problem is not that DAWN fails to capture heavy users. While not all DAWN episodes involve heavy users, many do. DAWN records show that many users are injection users, many report dependence as their reason for drug use and many use the ER for chronic problems associated with their use or as a route to obtaining treatment. These would all suggest that DAWN does serve a heavy usage population. However, there are many factors, other than underlying use patterns, that can account for changes in DAWN figures. For example, crowding of ERs can impact on DAWN counts, the quality of the drugs available on the streets can impact on DAWN, deteriorating health status among heavy users, rather than changes in their number, can influence the direction in which DAWN moves. Further, other influences that have made significant downturns in DAWN, at the same point in time across most DAWN cities, are unlikely to be mirrored in a heavy user population, simply because such a population is made up of chronic users, unlikely to radically change their behavior in a short period of time, and at the same time, in different communities. There must be other explanations for sudden drops across most DAWN cities at the same point in time.

The DAWN population is a highly self-selected sub-population of all users, including hard-core users, which if better understood might

¹⁴Rodewald, Wrenn and Slovis, 1992.

provide local policy makers with useful information about changing drug abuse patterns among this difficult to study sub-population.

In Appendix F we present a review of the various purposes for which DAWN has been used and a critique of those applications based on the DAWN system design. Several suggestions for modifications are provided. We believe that this review provides justification for the undertaking of an evaluation of DAWN to determine what role it serves, what needs exist for it to be improved and how, if at all, it can inform policy makers about hard-core drug use patterns. The evaluation should also consider whether alternatives to retrospective review of medical records on all patients might not yield more valid data.

4. ALTERNATIVE SYSTEMS TO FILL MAJOR DATA GAPS

Previous sections have focused on existing drug problem indicators and their strengths and weaknesses. In this section we discuss one major data gap across existing indicators, which is their failure to capture and describe heavy users, a group of increasing policy interest as more becomes known of the costs associated with heavy use and greater mandates are given to intervene effectively with this population.

It is not a critique of existing indicators that they fail to capture heavy drug use. They were not designed to do that. Heavy drug use, for all its high risks and costs, is relatively rare in the population. Yet some sectors, notably, public treatment, law enforcement, children's services and public primary and mental health providers are reportedly inundated with members of this population. For example, DUF consistently reports in almost all cities that more than half of arrestees are using some illicit substance. To capture better information about the characteristics and problems of heavy users, it might be feasible to turn to the public systems with which these users reportedly come into contact in large numbers.

Our approach in this section is to examine the potential of alternatives to population based surveys for studying hard-core chronic drug users, their use patterns, consequences and costs associated with heavy drug use.

One of the most important data gaps currently facing demand reduction policy planners is the lack of information about the hard-core user population in need of or seeking substance abuse treatment and their outcomes in treatment. A number of alternatives to surveys, including networked drug data information systems and registries, might improve needs and outcome assessment for this population.

OVERVIEW

Reporting systems are useful tools for collecting epidemiologic data. They are distinct from population based surveys in that individuals or cases contained in their databases are generated from

catchment points where individuals at risk, exposed or diagnosed are identified and entered into a monitoring system. These systems may be used to define the incidence, prevalence and specific characteristics of particular populations at risk. They can also continuously measure the trends and consequences of particular types of exposures, identify high risk populations and even assess the successes or failures of treatment and prevention efforts.

There may be many advantages for using reporting systems rather than alternative methods such as surveys. It may be argued, for example, that the most serious consequences of drug abuse will ultimately come to the attention of institutions, such as the criminal justice system, treatment facilities or hospital emergency rooms. Thus, these systems may be much more effective for identifying high risk populations such as chronic users.

Reporting systems may vary considerably in terms of their costs, their complexity and the types of issues they can realistically address. We describe surveillance networks and registries below.

In Appendix G we provide a description of the different types of reporting systems used in public health to monitor infectious diseases and chronic injuries. In this section we review their applicability as models for developing systems for monitoring problem drug use.

SURVEILLANCE NETWORKS

HHS has played a major role in the past, through the Centers for Disease Control and Prevention, in the development of epidemiological surveillance mechanisms for estimating the rate of chronic and infectious diseases requiring public health intervention. CDC has also built systems for identifying individuals with these conditions and linking their treatment episodes and outcomes. Legislation has been passed mandating reporting of certain diseases. National professional health associations have endorsed and help direct these systems. Funding for data collection, processing and systems support have been developed to maintain the surveillance programs.

ONDCP and other drug policy agencies could work with the public health sector to consider the possibility of including drug and alcohol

dependence in the reportable diseases system or of establishing separate surveillance systems for these conditions.

There is ample evidence that a small minority of users consume the vast majority of the illicit drugs (or at least the non-hallucinogenic drugs) and cause the vast majority of the social harm. Furthermore, the drug use and related behaviors of heavy users bring them into contact with the criminal justice system, public social services and health care systems. This suggests that rather than sampling particular populations, it might be easier simply to link the databases of various systems in which heavy drug users are already being identified on a regular basis.

The NIAAA has funded the development of epidemiologic laboratories, which are models that could be extended for this purpose. Several states have already begun to explore the feasibility of building these systems and desperately need the expertise of the Public Health Service in developing viable systems that combine comprehensive networking with protections of privacy.

No population based sample survey, no matter how well administered, can be expected to capture the heavy users. Individual catchment areas such as ER's and police departments also cannot be expected to represent the universe of heavy users. Yet these individual catchment centers -- police, primary and mental health care providers, and treatment providers -- deal repeatedly with the very population of heavy drug users about whom better information is needed. While no one system can be expected to capture them all, and each self-selects its clientele, if they were networked together into a substance abuse surveillance system we would expect that many heavy users over a short period of time would fall into at least one of the catchment nets. Most individual catchment nets handle the problem of multiple capture very well, e.g. rap sheets record multiple arrests, hospitals maintain patient identifiers to link multiple admissions, and treatment providers now often assign unique identifiers to their clients. The public health systems has been able to create linkable unique identifiers across a number of systems. The challenge for substance abuse surveillance would be to extend the network beyond health to link criminal justice and treatment providers

(at a minimum). Legal mandates would need to be created to develop such a system and ensure the confidentiality protections that it would require. The state of New Mexico has recently developed an integrated drug abuse information system of the type outlined above for use in determining treatment outcomes. Understanding its experience in this process would provide a valuable lesson for pursuing the feasibility issues surrounding such a design. Indeed the New Mexico system is quite broad. In addition to health, justice and treatment it include DMV, welfare, and employment databases in its network. Information from these various systems has been linked with the records of individual treatment clients.

REGISTRIES

An alternative to networking the individual information systems of various service sectors into a community wide surveillance system is the use of a registry. The role of local registries such as those in place for cancer and other disease monitoring, and those developed in the 70s for substance abuse should be reevaluated. The feasibility of drug registries has already been demonstrated; New York City had one for many years before it was disbanded because of lost funding. European and Asian countries also have drug user registries.¹⁵ Since the upper bound on the size of the heavy user population is something like 2-5 million, advancing computer technology would give a registry of today much more capability than those of the past. Civil liberties concerns would be an important issue to address determining appropriate identification technologies (e.g. fingerprints) that might be used.

Both surveillance networks and registries can capture most of the universe of interest by pooling input from multiple sources. For registries of drug users the chief problem is defining and identifying the registry eligible population. These systems can answer a wealth of questions that conventional surveys cannot because over time a longitudinal record is formed. In effect registries are panel data

¹⁵The Addicts Register in the U.K. is a national system. Malaysia is an example of a country with a registry that combines multiple sources of input.

sets. Hence they can address questions of progression, initiation, relapse, and so on.

Of course some members of the universe of heavy users would never be reported. Many heavy users (except for marijuana) are arrested, enter treatment or detox, or obtain health or social services within any 12 month period, but it is an open question as to the proportion of all heavy users they represent. Moreover, for some purposes heavy users who never commit crime, get sick, or demand treatment are in some sense less important to capture since their demands and impact on the system are low.

A substantial barrier to implementing a broad based registry is that our criminal justice and health care systems are both very decentralized, both across jurisdictions (several federal agencies, 50 state police, and thousands of county sheriffs and police department) and across functional levels (police, courts, corrections, etc.). Successful implementation also requires cooperation among service providers, who often see disincentives to reporting, are not aware of reporting requirements.

Advances in character and finger-print recognition technologies and pattern recognition techniques over the past few years have addressed some of the problems that reporting systems have faced in the past. Also communications and information technologies have reduced the burden of reporting and facilitated the query process for users of these systems.

Decisions would have to be made about the scope of the data base. For example, what range of drug related offenses would it include? If all arrestees were drug tested, it could also include people who were arrested for other offenses but who had positive drug tests. While testing is of course expensive it is already a regular procedure in Washington, DC and takes place quarterly for a small sample in all DUF jurisdictions. It is also not clear whether the system would record all arrests or just all convictions; many drug offenders, especially in big cities, have charges dropped from their criminal record.

Even thornier issues would need to be addressed for defining the scope of health system reporting. What kinds of symptoms, diagnoses,

test results would trigger reporting to the registry? Again, regular testing for drugs and alcohol is conducted in some facilities. Existing trauma registries might be expanded to include information on drug and alcohol involvement.

The content of core data sets is another issue that affects both implementation and utility of the system as well as the cost. Developing a core data set to meet the needs of the system's constituents would be an important minimum requirement. Each reporting source would be required to provide that level of data. Then different sectors might each have their own expanded core and supplemental data or special project data could be provided for in the record.

Registries also require new funding for their start-up, implementation, maintenance and support, and appropriate institutional bases.

SIMILARITIES AND DIFFERENCES BETWEEN THE DRUG AND HEALTH MODELS FOR SURVEILLANCE

In order to evaluate the feasibility of using the public health model approach for the surveillance of drug abuse, it is important to point out similarities and differences between the two fields.

There are a number of ways in which the problems for surveillance of diseases/exposures and drugs are quite similar. There is both a social stigma of being diagnosed or living with certain diseases and using drugs. Certainly AIDS and other sexually transmitted diseases are clear examples of diseases with social stigmas attached to them, and negative consequences are possible if confidentiality were breached. Therefore, there is a critical need for confidentiality in both situations.

As in the case of disease, the more serious the case of drug abuse, the more likely the individual will be captured within the infrastructure of an institutional setting, such as health, treatment or criminal justice system. Even more importantly, the infrastructure currently exists in this country to capture these cases (unlike the situation in certain foreign countries). This allows for the capture of cases from a broad spectrum of designated locations and makes it less likely the case will be missed. While new cases will certainly be

identified, it also makes it more likely that the more serious cases will be entered into surveillance. From a societal context, these are the people that are most important to capture, because they are the ones who incur and impose the greatest costs and are most in need of treatment.

Finally, the issue of testing is a common thread in both situations. There are many diseases and drugs where specific tests may be conducted in order to confirm their presence. Such tests offer some level of objectivity and consistency between diagnoses which helps improve the validity of the data collected about a particular case. However this is also an area where important differences arise. One of the major differences between evaluating diseases and drug abuse may also be defined as a testing issue. Perhaps the reason that many of the public health surveillance systems have been so successful in identifying diseases in the population is because there are generally very specific tests that may be conducted in order to identify the presence or absence of the disease in question. This is true in the case of many infectious diseases, cancers and birth defects. In the case of cancers, for example, a pathology report will not only verify the presence of disease, it will also describe the "stage", or how early the disease was detected. This type of information may be used, for example, to target screening and education programs more effectively so that areas in the country where the stage of disease tends to be more advanced can become the focus for intervention. Testing is generally part of a larger protocol that the physician follows in order to make a diagnosis and identify a particular disease.

This is where the crucial difference between the public health surveillance and drug model occurs. Except in specific cases, there is a sentinel health event that is diagnosed and entered into a disease registry. Each disease tends to have a high-risk population associated with it. For example, if one considers the case of melanoma, the high-risk population would be fair skinned people who have had serious sunburns, those with nevi (a type of mole) of a certain size or coloration, etc. If a physician takes a proper case history, these risk factors will become apparent and the testing procedure, in this case a

biopsy, may ensue. In the case of drugs, however, there is generally no clear cut adverse health outcome or high-risk population to be targeted. These are two very important differences between the public health and drug models. While there are certainly different drug using populations that may be identified, such as pregnant women, the homeless or criminals, these groups are too broad to be useful as a tool for case identification. Unlike certain high-risk populations for some diseases', the drug using population is not confined to a specific age group, race, sex, or geographic location. In addition, the adverse health outcomes that result from drug abuse may never be associated with the use itself. For example, accidents may occur because of altered mental states, but the health outcome to be treated might be a broken leg. Other health effects may be so diffuse, such as gastrointestinal problems or changes in blood pressure, that there is never a "sentinel" health outcome specifically associated with drug use. However, there are some risk factors of serious drug abuse that are rather easily identified, especially in a clinical setting. These are the tell-tale physical signs of injecting use, such as tracks, inflammation, scars, etc.

Perhaps the most obvious but important difference between disease and drug abuse surveillance is the simple fact that drugs are illegal and diseases are not. The people diagnosed with disease are likely to be interested in pursuing their health status because they clearly have a vested interest in doing so. This means they will continue to frequent the agencies (e.g. hospitals, laboratories) that will allow for continued reporting and surveillance. It is probably a fair assumption that these people will be honest in their reporting behavior, because it will clearly benefit their treatment to do so. On the other hand, the fact that drug use is illegal makes for an entirely different behavior pattern than those diagnosed with disease. These people could try to avoid being captured by the agencies who want to track them and they may see less incentive to be honest about their drug use history. In fact, service providers may perceive the greatest disincentive for reporting because of the legal issue. This means that for a system to be successful, it must be able to absolutely guarantee that identities

of individuals will not be released without their consent and that negative consequences will not result for these reported.

All of the similarities and differences between drug and disease testing should be considered in determining the feasibility of constructing surveillance systems. There are likely to be many situations when such efforts are inappropriate and where resource are better spent on alternative strategies. Still, there may be a number of areas, such as focusing on a particular drug or a particular geographic region, where surveillance efforts will provide a useful alternative to population based surveys for studying heavy drug users and planning appropriate intervention strategies.

FURTHER RESEARCH REQUIRED

What could be gained by instituting local or state wide drug abuse surveillance system? Their utility may be much greater at the local and state policy level than at the national level, yet numerous local indicator systems already exist (e.g., DUF, DAWN) and are sponsored at the national level. Clearly there are a number of advantages that may be gained. There are currently many unanswered questions about the ability of our nation's criminal justice, health care and treatment systems to successfully deal with drug abuse. Greater emphasis is being placed on coordination of services for drug abusers across these systems. Sharing information would be a useful starting point. In addition, there is much to be learned about the different populations of problem users who come into contact with these systems.

There would be significant limitations of such systems too. They would be directed at problem use, but might well capture a great deal of casual use. They would not be useful for national estimates of problem use. They would certainly raise civil liberties concerns. Yet because they can so successfully target on populations of greatest public concern, indepth review of prior experience and the feasibility of implementation is worth considering.

A first step might be to select a particular city (perhaps a Community Epidemiology Working Group [CEWG] city) or county to test the feasibility of conducting drug surveillance on a pilot scale. Should

this be successful, a number of strategically selected communities could be targeted throughout the nation. This approach resembles the current DAWN system, and our national cancer surveillance system, where certain states or cities have been selected as representative of our nation. Using this approach we might begin to characterize the drug abuser's array of problems and outcomes of interactions with service delivery in ways that previously have not been possible.

5. POLICY FRAMEWORK FOR IDENTIFYING DATA AND ANALYSIS NEEDS

INTRODUCTION

If federal policy begins to shift away from its strict emphasis on use reduction and enforcement approaches, to include greater emphasis on reduction of the harms and costs associated with use, a greater emphasis will be placed on data that describe use and harms among sub-populations such as problem users where the bulk of costs of use are incurred and imposed. But other possible policy shifts will have different implications for data development.

For example, during the past few years Congress, federal agencies, and state legislatures around the country have called for greater rationality in the allocation of resources and greater accountability for the expenditure of public dollars for alcohol and other drug abuse intervention programs. These mandates have also begun to shift the emphasis on data development away from prevalence indicators toward indicators of need for treatment and outcomes, data that will probably continue to be in much greater demand than they have in the past.

With expanding knowledge of the complexities of drug use the demand for more detailed data has also expanded. With greater emphasis on the policy support role of data and analysis we should expect that new data requirements will continue to emerge. For example, researchers have recently pointed out the high rates of Tuberculosis among hard core drug users. In response federal policy makers have mandated that block grant recipients identify these cases among their clients. States are scrambling to modify their treatment client databases in order to respond to this new data requirement. The mandate for reporting reaches to the level of local treatment programs and administrators who are also being held more accountable.

While it is impossible to predict all future data requirements, it is possible, using a policy-based framework, to identify the major components of a policy decision data support system against which existing data and data gaps can be evaluated.

To ensure that data will have applicability to policy decision the data system must be designed in terms of the policy issues the data consumers face. Given specific short and long-term policy issues, research can be tailored to address them. However, because policy issues change over time in response to changing mandates, goals and environments, a broad view of policy areas provides a more flexible and dynamic framework within which to identify core data and analysis needs. Systems can then be designed with flexibility to adapt to changing data needs.

ONDCP POLICY DOMAINS

We have identified five different domains of policy making that ONDCP has responsibility for as the nation's primary agency for coordinating drug control efforts. These include:¹⁶

1. Monitoring the status of drug use and drug problems nationwide;
2. Developing national policies and strategies for supply and demand reduction efforts to curb drug use and combat drug problems;
3. Allocating federal resources across and within supply and demand reduction sectors, geographic areas, target drugs, and populations to implement federal strategies;
4. Evaluating the effectiveness of federal drug control efforts;
5. Coordinating federal agencies involved in drug control.

DESIGNING A DATA SYSTEM TO SUPPORT POLICYMAKING

Based on our review of policy domains, our conclusion is that policy formulation at the national level requires an integrated, comprehensive decision support system, composed of multiple data systems and analytic tools to provide the basis for a wide range of policy analyses. The data collection will continue to be developed and sponsored by a variety of agencies, which necessitates the development of a mechanism for coordination of data development within a decision support framework.

¹⁶ONDCP, 1990.

We identified four categories of data required to address issues in these policy areas. In addition to data on population based substance use, these include data on drug markets and production, community level consequences, and interventions such as prevention, treatment and enforcement programs. Each data domain should be conceptually and operationally defined. The systems approach would identify what links are needed across data systems in order to integrate data from one domain with data from another. A range of analytic techniques required to support decisionmaking from these data are also required. These include prevalence estimation, diffusion analysis, trend analysis, forecasting and modeling.

The discussion in the remainder of this section outlines what such a system would look like, what characteristics it would need to possess, and what data it needs as inputs. We outline the kinds of analytic capabilities it should have and what policy application the data and analysis could support.

OVERVIEW

Figure 3 shows the framework for a policy driven decision support data system. As shown in this figure, four integrated data systems, defined by core policy questions are needed to support ONDCP's policy function. The first is used to describe drug use patterns and individual problems and needs for services associated with use. A second describes the supply and availability of drugs. The third data component supplies information on social and economic consequences of use, such as morbidity, mortality, crime and lost productivity. The fourth data system supplies information on the control system's response, in the form of interventions such as delivery of treatment services, interdiction levels, etc.

To become more useful in policy applications the contents of each data system need to be redefined based on the key policy questions, not the existing data infrastructure. For example, data are needed to inform decisionmaking about hard core drug use. When existing data are pressed to answer questions they were not developed to address, not only are the answers invalid, but the data gap identified by the question

goes unfilled. A systematic effort is needed to identify the key questions, extend analyses to evaluate the applicability of the existing data, such as analyses described in earlier sections; and determine the major data gaps that impede analysis of some issues. A serious role for empirical analysis in formulation of policy will only be gained if the data have credibility for addressing the policy questions. Continuous debates, e.g. about the scope of the problem, arise when the data don't have legitimacy for addressing the questions. If we defined what data are needed, continuously reviewed those needs, and set up a program to build a data infrastructure, we'd have in place the data to address a variety of policy issues. Without such a plan every question is addressed with what data we have, rather than what data we need.

The separate systems need to be linked on a number of levels, including jurisdiction, population characteristics, providers, and clients. Within a data system the various databases should have common measures, e.g. of use, history, or cross walks that enable comparisons to be made. For example, a study among a heavy user population might collect more frequent use data than a household survey. But the frequent use measures should aggregate to those used in other population surveys. Also bridges across data sets are needed if it is important to sum across different populations captured in different databases. The most difficult challenge in building an integrated information base is that the data are generated by a multitude of different sponsors, whose individual data requirements have proved in the past to be incompatible. While this might continue to be the case, explicitly recognizing the need for integrated data and specifying where links are required would be a step forward. With a blueprint in place new systems design could be compliant and modifications to existing systems could be made on an incremental basis.

The data systems serve as input to a variety of analyses, which should range from simple graphical presentation of univariate statistics to sophisticated simulation modeling used to project impacts of different policy options. An illustrative list of analysis tools is shown on Figure 3. Policy analysis often calls on different kinds of data and involves multiple stages of analysis. To facilitate expanded

analysis greater access to raw files is needed. There is little to be gained from data improvement efforts unless the issue of access is thoroughly addressed and obstacles to dissemination of existing data are overcome.

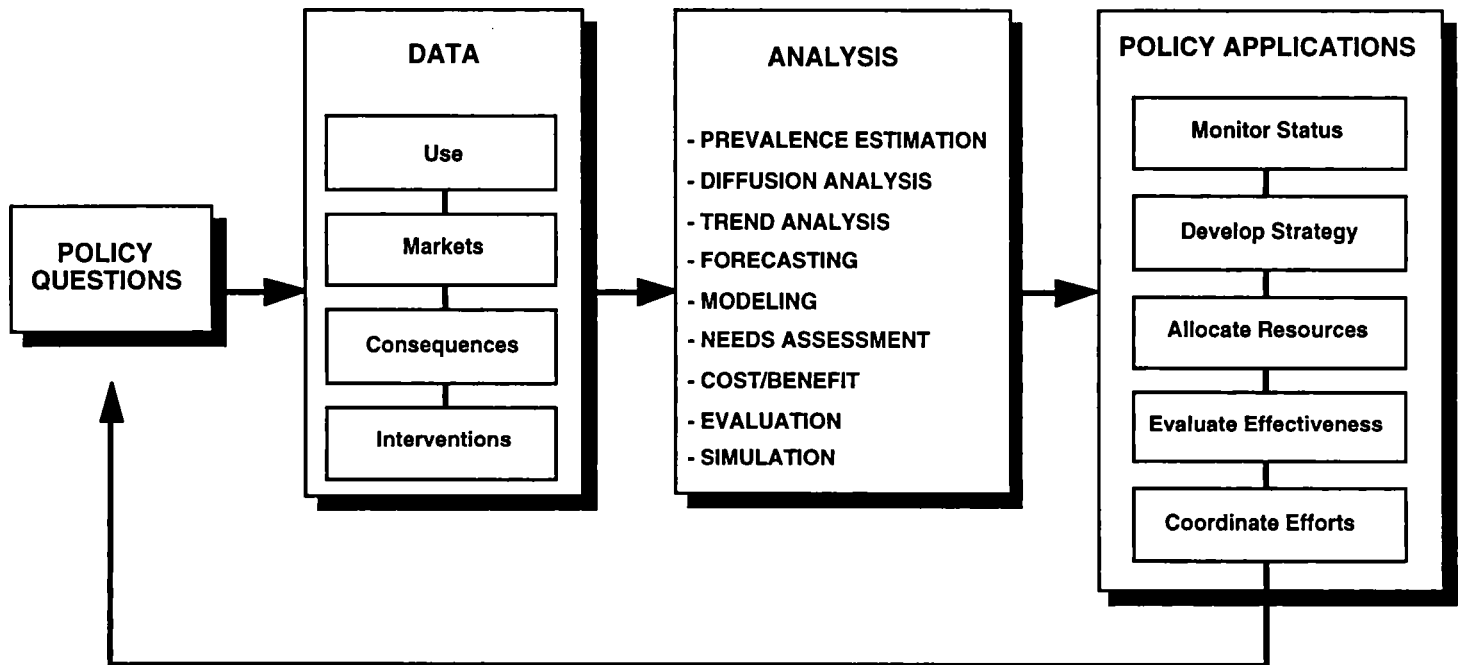


Fig. 3-System to Support Policy Decisionmaking

It is in various analyses that data from different systems, e.g., drug use and community consequences will need to be integrated. Analytical work, e.g., development of policy based statistical models can help to identify data needs. For example, forecasting models demonstrate that need for data on quitting dates, or desistance from use are needed in addition to initiation and prevalence data.

The system we envision is designed to use feedback from analysis to modify data systems rather than continuously relying on inadequate data. The output from analysis is fed into the policy process. The structure is such that multiple policy domains can be served with key data and analysis and the policy questions and needs drive the data system development and analysis.

Policy applications for drug data compete with basic science needs and management information needs for data. Not all drug data can or should be incorporated into a policy decision support framework. But such a framework, if elaborated, could better articulate the kind of information that would support policy in different domains and evaluate existing data from a system perspective, rather than an individual database perspective. We believe this approach, if it could be developed, holds great promise for producing more comprehensive drug policy analysis than approaches that either use existing data, whether or not they are appropriate, for lack of anything better or invent new databases in the isolation of only one specific policy data need.

REFERENCES

- Alcoholism and Drug Abuse Weekly*. Vol. 4, No. 5, January 29, 1992, p. 5.
- American Hospital Association, *Hospital Statistics: 1989-90 Edition*, 1990.
- American Hospital Association, *Hospital Statistics: 1990-91 Edition*, 1991.
- American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorder*, 3 edition, revised, Washington, DC: American Psychiatric Association, 1987.
- Andrulis, Dennis P., Arthur Kellermann, Elizabeth A. Hintz, Bela B. Hackman and Virginia Beers Weslowski, "Emergency Departments and Crowding in United States Teaching Hospitals," *Annals of Emergency Medicine*, Vol. 20, No. 9, September 1991, pp. 980-986.
- Bachman, J.G., Lloyd D. Johnston and Patrick O'Malley, "Explaining the Recent Decline in Cocaine Use Among Young Adults: Further Evidence That Perceived Risks and Disapproval Lead to Reduced Drug Use," *Journal of Health and Social Behavior*, Vol. 31, No. 2, June 1990, pp. 173-184.
- Bachman, J.G., L.D. Johnston, P.M. O'Malley and R.H. Humphrey, "Explaining the Recent Decline in Marijuana Use: Differentiating the Effects of Perceived Risks, Disapproval and General Lifestyle Factors," *Journal of Health and Social Behavior*, Vol. 29, No. 1, 1988, pp. 92-112.
- Bailey, David N., "Drug Use in Patients Admitted to a University Trauma Center: Results of Limited (Rather than Comprehensive) Toxicology Screening," *Journal of Analytical Toxicology*, Vol. 14, 1990, pp. 22-24.
- Baird, M.A., "A Scheme for Determining the Prevalence of Alcoholism in Hospitalized Patients," *Alcoholism: Clinical and Experimental Research*, Vol. 13, No. 6, 1989, pp. 782-785.
- Barbee, James G., Peter D. Clark, Michael S. Crapanzano, Gerald C. Heintz, and Catharine E. Kehoe, "Alcohol and Substance Abuse Among Schizophrenic Patients Presenting to an Emergency Psychiatric Service," *The Journal of Nervous and Mental Disease*, Vol. 177, No. 7, 1989, pp. 400-407.
- Baser, M.E. "The Development of Registries for Surveillance of Adult Lead Exposure, 1981 to 1992." *American Journal of Public Health*. Vol. 82, No. 8, August 1992, pp. 1113-1118.

Birch & Davis Associates, Inc., *DAWN Briefings*, Vol. 8, No. 2., 1992.

BOTEC Analysis Corporation, *Heroin Situation Assessment*, A Working Paper Done For The Office Of National Drug Control Policy, January 10, 1992.

Bray, Robert M., William E. Schlenger, S. Gail Craddock, Robert L. Hubbard, and J. Valley Rachal, *Approaches to Assessment of Drug Use in the Treatment Outcomes Prospective Study*, Research Triangle Park, NC: Research Triangle Institute, RTI/1901/01-05S, 1982.

Brookoff, Daniel, Elizabeth A. Campbell and Leslie M. Shaw, "The Underreporting of Cocaine-Related Trauma: Drug Abuse Warning Network Reports vs Hospital Toxicology Tests," *American Journal of Public Health*, Vol. 83, No. 3, 1993, pp. 369-371.

Brown, Lee P., Dr., *The Role of Research in the Campaign Against Drugs*, Fourth Annual Conference on Evaluating Drug Control Initiatives, National Institute of Justice, Washington, DC, June 29, 1993.

Centers for Disease Control. "Case Definitions for Public Health Surveillance." *Morbidity and Mortality Weekly Report*. Vol. 39, No. RR-13, October 19, 1990, pp. 1-43.

Centers for Disease Control. "Guidelines for Evaluating Surveillance Systems." *Morbidity and Mortality Weekly Report*. Vol. 27, No. S-5, May 6, 1988, pp. 1-18.

Centers for Disease Control. "Linking Multiple Data Sources in Fetal Alcohol Syndrome Surveillance - Alaska." *Morbidity and Mortality Weekly Report*. Vol. 42, No. 16, April 30, 1993.

Centers for Disease Control. "National Survey of Existing Trauma Registries - United States, 1987." *Morbidity and Mortality Weekly Report*. Vol. 38, No. 49, December 15, 1989, pp. 857-859.

Centers for Disease Control. "Proceedings of the 1992 International Symposium on Public Health Surveillance." *Morbidity and Mortality Weekly Report*. Vol. 41, Supplement, December 1992, pp. 1-217.

Centers for Disease Control. "Report from the Trauma Registry Workshop, Including Recommendations for Hospital-Based Trauma Registries." *The Journal of Trauma*. Vol. 29, No. 6, June 1989, pp. 827-834.

Champion, Howard R. and Harry Teter, "Trauma Care Systems: The Federal Role," Editorial, *The Journal of Trauma*, Vol. 28, No. 6, 1988, pp. 877-879.

Chang, G., B. Astrachan, U. Weil and K. Bryant. "Reporting Alcohol-Impaired Drivers: Results From a National Survey of Emergency Physicians." *Annals of Emergency Medicine*. Vol. 21, No. 3, March 1992, pp. 284-290.

- Chasnoff, I.J., "Drug Use and Women: Establishing a Standard of Care," *Annals of New York Academy of Science*, Vol. 562, 1989, pp. 208-210.
- Chasnoff, I.J., G. Chisum and W. Kaplan, "Maternal Cocaine Use and Genitourinary Tract Malformations," *Teratology*, Vol. 32, No. 3, 1988, pp. 201-204.
- Chasnoff, I.J., H.J. Landress and M.E. Barrett, "The Prevalence of Illicit drug or Alcohol Use During Pregnancy and Discrepancies in Mandatory Reporting in Pinellas County, Florida," *New England Journal of Medicine*, Vol. 322, 1990, pp. 1202-1206.
- Chasnoff, I.J., W.J. Burns, S.H. Schnoll, and K.A. Burns, "Cocaine Use in Pregnancy," *The New England Journal of Medicine*, Vol. 313, 1985, pp. 666-669.
- Chassin, Presson, Sherman, Corty and Olshavsky, "Adolescent Substance Use and Abuse," *Advances in Child Behavioral Analysis and Therapy*, Vol. 3, P. Karoly and J.J. Steffen, eds., pp. 99-153, Lexington, KY: Lexington Books, 1984.
- Cherpitel, C.J.S., "Alcohol Consumption and Casualties: A Comparison of Two Emergency Room Populations," *British Journal of Addiction*, Vol. 83, 1988, pp. 1299-1307.
- "DAWN, Household Data Shake Administration Drug War Claims," *Alcoholism & Drug Abuse Weekly*, Vol. 4, No. 1, January 1, 1992.
- Dinwiddie, Stephen H., Theodore Reich and C. Robert Cloninger, "Lifetime Complications of Drug Use in Intravenous Drug Users," *Journal of Substance Abuse*, Vol. 4, 1992, pp. 13-18.
- Drugs and Drug Abuse Education Newsletter, "New Hospital Data Show ER Admissions Up 12% From '90-'91," Vol. 23, No. 6, June 1991, pp. 51, 54-58.
- Dunlop, M.G., and D.J. Steedman, "Intravenous Drug Abuse and the Accident and Emergency Department," *Archives of Emergency Medicine*, Vol. 2, 1985, pp. 73-77.
- Ebener, Patricia A., Eva Feldman, and Nora Fitzgerald, *Federal Databases for Use in Drug Policy Research: A Catalogue for Data Users*, Santa Monica, CA: RAND, N-3562-DPRC, 1993.
- Ebener, Patricia A. and Daniel McCaffrey, "Understanding Variation in Local and National Cocaine Abuse Patterns in DAWN," Mimeo, April 17, 1992.
- Ellickson, Phyllis, "Helping Urban Teenagers Avoid High-Risk Behavior: What We've Learned from Prevention Research," *Urban America*, James B. Steinberg, David W. Lyon and Mary E. Vaiana, eds., 1992, pp. 105-126.

- Ellickson, P.L. and R.M. Bell, "Drug Prevention in Junior High: A Multi-Site Longitudinal Test," *Science*, Vol. 247, March 1990, pp. 1299-1305.
- Ellickson, P.L., R.M. Bell, M. Thomas, A.E. Robyn, and G.L. Zellman, *Designing and Implementing Project ALERT: A Smoking and Drug Prevention Experiment*, Santa Monica, CA: RAND, R-3754-CHF, 1988.
- Ellickson, P.L. and R.D. Hays, "On Becoming Involved with Drugs: Modeling Adolescent Drug Use Over Time," *Health Psychology*, Vol. 11, No. 6, 1992, pp. 377-385.
- Fagan, Jeffrey and Edward Pabon, "Contributions of Delinquency and Substance Use to School Dropout Among Inner-City Youths," *Youth & Society*, Vol. 21, No. 3, March 1990, pp. 306-354.
- Feldkamp, Robert H., "Drug-Related Trips to Hospital Emergency Rooms Down Sharply in Survey," *Narcotics Demand Reduction Digest*, Vol. 3, No. 7, July 1991, pp. 1-4.
- Frykholm, Bo and L.M. Gunne, "A Swedish Drug Abuse Warning Network," *Drug and Alcohol Dependence*, Vol. 5, 1980, pp. 161-165.
- Galanter, Marc, Ricardo Castaneda and Johanna Ferman, "Substance Abuse Among General Psychiatric Patients: Place of Presentation, Diagnosis, and Treatment," *Am. J. Drug Alcohol Abuse*, Vol. 14, No. 2, 1988, pp. 211-235.
- General Accounting Office (GAO), *Drug Use Measurement: Strengths, Limitations, and Recommendations for Improvement*, Washington, DC: June 1993.
- Gerber, Jurg and Robert J. Hunter, *On the Extent of Drug Abuse: Emergency Room Admissions as an Alternative Source of Data*, Paper that was presented at the annual meetings of the Academy of Criminal Justice Sciences, Nashville, TN, March 1991.
- Gerstein, Dean R. and Henrick J. Harwood, eds., *Treating Drug Problems*, Vol. 1, Washington, DC: Institute of Medicine, 1990.
- Gfroerer, J and M. Brodsky, "The Incidence of Illicit Drug Use in the United States, 1962-1989," *British Journal of Addiction*, 1992, p. 87.
- Gfroerer, Joseph and Arthur Hughes, "Collecting Data on Illicit Drug Use by Phone," *Survey Measurement of Drug Use: Methodological Studies*, Charles Turner, Judith Lessler and Joseph Gfroerer, eds., Rockville, MD: National Institute on Drug Abuse, DHHS Publication No. (ADM) 92-1929, 1992, pp. 277-295.

- Gottlieb, Nell H., Patricia D. Mullen and Alfred L. McAlister, "Patients' Substance Abuse and the Primary Care Physician: Patterns of Practice," *Addictive Behaviors*, Vol. 12, 1987, pp. 23-32.
- "Government Surveys Show Rise in Cocaine and Heroin Abuse," *C.J. Newsletter*. Vol. 22, No. 24, 1991, p. 5.
- Greenberg, A.E., R. Hindin, A.G. Nicholas, E L Bryan and P.A. Thomas. "The Completeness of AIDS Case Reporting in New York City." *Journal of the American Medical Association*. Vol. 269, No. 23, June 16, 1993, pp. 2995-3001.
- Greenberg, Robert E., Theodore Colton and Curtis Bagne, "Measurement of Cancer Incidence in the United States: Sources and Uses of Data," *JNCI*, Vol. 68, No. 5, May 1982, pp. 743-750.
- Greene, M.H., *Estimating the Prevalence of Heroin Use in a Community*, 1974.
- Haaga, John and Peter Reuter, eds., *Improving Data for Federal Drug Policy Decisions*, Santa Monica, CA: RAND, N-3241-BJS, 1991.
- Haenszel, W., "The United States Network of Cancer Registries," *Recent Results Cancer Res.*, Vol. 50, 1975, pp. 52-58.
- Harrison, Ellen R., John Haaga and Toni Richards, "Self-Reported Drug Use Data: What Do They Reveal?" *Am. J. Drug Alcohol Abuse*, Vol. 19, No. 4, 1993, pp. 423-441.
- Harrison, Lana and Joseph Gfroerer, "The Intersection of Drug Use and Criminal Behavior: Results From the National Household Survey on Drug Abuse," *Crime & Delinquency*, Vol. 38, 1992, pp. 422-443.
- Helms, Dennis J., Esq., "A Guide to the New Federal Rules Governing the Confidentiality of Alcohol and Drug Abuse Patient Records," *Contemporary Drug Problems*, Fall 1975, pp. 259-284.
- Hibbs, J.R., W.S. Ceglowski, M. Goldberg and F. Kauffman. "Emergency Department-Based Surveillance for Syphilis During an Outbreak in Philadelphia." *Annals of Emergency Medicine*. Vol. 22, No. 8, August, 1993, pp. 1286-1290.
- Holland III, Reuben W., John A. Marx, Michael P. Earnest, and Stacie Ranniger, "Grand Mal Seizures Temporally Related to Cocaine Use: Clinical and Diagnostic Features," *Annals of Emergency Medicine*, Vol. 21, No. 7, 1992, pp. 772-776.
- Horgan, C., M. Rosenbach, E. Ostby and B. Butrica, "Targeting Special Populations with Drug Abuse Problems: Pregnant Women," *NIDA Drug Abuse Services Research Series #1*, 1991.

- Hser, Yih-Ing, M. Douglas Anglin, Thomas D. Wickens, Mary-Lynn Brecht and Jack Homer, *Techniques for the Estimation of Illicit Drug-Use Prevalence: An Overview of Relevant Issues*, Washington, DC: National Institute of Justice, NCJ-133786, May 1992.
- Hubbard, Robert L, Mary Ellen Marsden, J. Valley Rachal, Henrick J. Harwood, Elizabeth R. Cavanaugh and Harold M. Ginzburg, *Drug Abuse Treatment, A National Study of Effectiveness*, Chapel Hill, NC: The University of North Carolina Press, 1989.
- Humphreys, T., F.S. Shofer, S. Jacobson, C Coutifaris and A. Stenhagen. "Preformatted Charts Improve Documentation in the Emergency Department." *Annals of Emergency Medicine*. Vol. 21, No. 5, May, 1992, pp. 534-540.
- Hyatt, R. and W. Rhodes, "Price and Purity of Cocaine: The Relationship to Emergency Room Visits and Deaths, and to Drug Among Arrestees," *Office of National Drug Control Policy*, white paper, October, 1992.
- Iguchi, Martin Y., et al., "Correlates of HIV Seropositivity Among Injection Drug Users Not In Treatment," *The Journal of Drug Issues*, Vol. 22, No. 4, 1992, pp. 849-866.
- Isikoff, Michael, "Hospital Data Indicate Rise in Hard-Core Drug Abuse," *The Washington Post*, May 13, 1992.
- Isikoff, Michael, "Cocaine-Related Cases Rise to Record Level," *The Washington Post*, October 24, 1992.
- Januzik, S.J. "Application of Microcomputers in the Emergency Department: Experience with a Computerized Logbook." *Annals of Emergency Medicine*. Vol. 15, No. 10, October 1986, pp. 1200-1202.
- Johnston, L., "Etiology and Prevention of Substance Use: What Can We Learn From Recent Historical Changes?" *Etiology of Drug Abuse: Implications for Prevention*, C. Jones and R. Battjes, eds., Vol. 56, Rockville, MD: National Institute on Drug Abuse, 1985.
- Johnston, L.D., P.M. O'Malley and J.G. Bachman, *Drug Use Among American High School Seniors, College Students and Young Adults, 1975-1990 (Volume I: High School Seniors)*, Rockville, MD: National Institute on Drug Abuse, 1991.
- Kandel, D., "Drug and Drinking Behavior Among Youth," *Annual Review of Sociology*, Vol. 6, 1980, pp. 235-285.
- Kandel, D., "Stages in Adolescent Involvement in Drug Use," *Science*, Vol. 190, 1975, pp. 912-914.

- Kellermann, Arthur L., Stephan D. Fihn, James P. LoGerfo, and Michael K. Copass, "Utilization and Yield of Drug Screening in the Emergency Department," *American Journal of Emergency Medicine*, Vol. 6, No. 1, 1988, pp. 14-20.
- King, Rufus, "The Unwinnable War on Drugs: Why the ABA Should Pull Out," *Criminal Justice*, Vol. 7, No. 3, 1992, pp. 10-15, 49-52.
- Kirby, Jackie M., Kimball I. Maull and Worley Fain, "Comparability of Alcohol and Drug Use in Injured Drivers," *Southern Medical Journal*, Vol. 85, No. 8, 1992, pp. 800-802.
- Klaucke, Douglas N., James W. Buehler, Stephen B. Thacker, R. Gibson Parrish, Frederick L. Trowbridge, et al., "Guidelines for Evaluating Surveillance Systems," *MMWR*, Supplement, Vol. 37, No. S-5, May 6, 1988.
- Kleiman, Mark A.R., *Against Excess*, Basic Books, ___, 1992.
- Kleiman, Mark A.R. and Jonathan P. Caulkins, "Heroin Policy for the Next Decade," *Annals of the American Academy of Political and Social Science*, Vol. 521, May 1992, pp. 163-174.
- Kopstein, Andrea, "Drug Abuse Related Emergency Room Episodes in the United States," *British Journal of Addiction*, Vol. 87, 1992, pp. 1071-1075.
- Kozel, N.J. "The Role of Networks in Drug Abuse Surveillance: An Account of the History, Implementation, and Development of the Community Epidemiology Work Group Model." *Health Related Data and Epidemiology in the European Community*. Luxembourg: Office for Official Publications of the European Communities, 1993.
- Lavenhar, M.A., A. Sheffert, H. DuVal and D.B. Loria. "The New Jersey Medical School Narcotics Case Register: Methodology and Summary of First Four Years of Operation." *Addictive Diseases: An International Journal*. Vol. 1 No. 4, 1975, pp. 513-527.
- Lillie-Blanton, M., J.C. Anthony and C.R. Schuster, "Probing the Meaning of Racial/Ethnic Group Comparisons in Crack Cocaine Smoking," *Journal of the American Medical Association*, Vol. 269, No. 8, 1993, pp. 993-997.
- Lindenbaum, Gary A., Stanton F. Carroll, Ierachmiel Daskal, and Regina Kapusnick, "Patterns of Alcohol and Drug Abuse in an Urban Trauma Center: The Increasing Role of Cocaine Abuse," *The Journal of Trauma*, Vol. 29, No. 12, 1989, pp. 1654-1658.
- Ling, Louis, "Emergency Medicine," *Journal of the American Medical Association*, Vol. 268, No. 3, 1992, pp. 351-352.

- "Linking Multiple Data Sources in Fetal Alcohol Syndrome Surveillance-- Alaska," *MMWR*, Vol. 42, No. 16, April 30, 1993, pp. 312-314.
- Little, B.B., L.M. Snell and L.C. Gilstrap, "Methamphetamine Abuse During Pregnancy: Outcome and Fetal Effects," *Obstetrics and Gynecology*, Vol. 72, 1988, pp. 541-544.
- Litovitz, Toby L., Karen C. Holm, Kathleen M. Bailey and Barbara F. Schmitz, *1991 Annual Report of the American Association of Poison Control Centers National Data Collection System*, 1991.
- Marzuk, Peter M., Kenneth Tardiff, Andrew C. Leon, Marina Stajic, Edward B. Morgan, and J. John Mann, "Prevalence of Recent Cocaine Use Among Motor Vehicle Fatalities in New York City," *JAMA*, Vol. 263, No. 2, 1990, pp. 250-256.
- Marzuk, Peter M., Kenneth Tardiff, Dennis Smyth, Marina Stajic, and Andrew C. Leon, "Cocaine Use, Risk Taking, and Fatal Russian Roulette," *Journal of the American Medical Association*, Vol. 267, No. 19, 1992, pp. 2635-2637.
- McCoy, H. Virginia and Christine Miles, "A Gender Comparison of Health Status Among Users of Crack Cocaine," *Journal of Psychoactive Drugs*, Vol. 24, No. 4, October-December 1992, pp. 389-397.
- McNaghy, Sally E. and Ruth M. Parker, "High Prevalence of Recent Cocaine Use and the Unreliability of Patient Self-report in an Inner-city Walk-in Clinic," *JAMA*, Vol. 267, No. 8, February 26, 1992, pp. 1106-1108.
- Medical News and Perspectives, "Attacks on Homosexual Persons May be Increasing, But Many 'Bashings' Still Aren't Reported to Police," *Journal of the American Medical Association*, Vol. 267, No. 22, 1992, pp. 2999-3000.
- Medical News and Perspectives, "CDC Investigators Explore New Territory in Aftermath of Unrest in Los Angeles," *Journal of the American Medical Association*, Vol. 267, No. 22, 1992, pp. 3001-3002.
- Medical News and Perspectives, "Congress Acts to Resuscitate Nation's Financially Ailing Trauma Care Systems," *Journal of the American Medical Association*, Vol. 267, No. 22, 1992, pp. 2994-2996.
- Medical News and Perspectives, "Guns, Drugs Threaten to Raise Public Health Problem of Violence to Epidemic," *Journal of the American Medical Association*, Vol. 267, No. 22, 1992, pp. 2993.
- Mensch, Barbara and Denise Kandel, "Dropping Out Of High School and Drug Involvement," *Sociology of Education*, Vol. 61, April 1988, pp. 95-113.

- Mittleman, Roger E. and Charles V. Wetli, "Death Caused by Recreational Cocaine Use," *Journal of the American Medical Association*, Vol. 252, No. 14, 1984, pp. 1889-1893.
- Model, Karyn E., *The Effect of Marijuana Decriminalization on Hospital Emergency Room Drug Episodes: 1975-1978*, 1991.
- Moore, Richard D., Lee R. Bone, Gail Geller, Joyce A. Mamon, Emma J. Stokes and David. M. Levine, "Prevalence, Detection, and Treatment of Alcoholism in Hospitalized Patients," *Journal of the American Medical Association*, Vol. 261, No. 3, 1989, pp. 403-407.
- Murnaghan, J.H. "Uniform Basic Data Sets for Health Statistical Systems." *International Journal of Epidemiology*. Vol. 7, No. 3, 1978, pp. 263-269.
- Musto, David F., *The American Disease: Origins of Narcotics Control*, New York, NY: Oxford University Press, 1987.
- National Institute on Drug Abuse, *Annual Emergency Room Data, 1991: Data from the Drug Abuse Warning Network, Series I, Number 11-A*, Washington, DC: U.S. Department of Health and Human Services, 1992.
- National Institute on Drug Abuse, *Heroin Indicators Trend Report*, 1976.
- National Institute on Drug Abuse, *Instruction Manual for Hospital Emergency Departments*, Washington, DC: U.S. Department of Health and Human Services, 1987.
- National Institute on Drug Abuse, *National Household Survey on Drug Abuse: Main Findings 1985*, Rockville, MD: 1988
- National Institute on Drug Abuse, *National Household Survey on Drug Abuse: Main Findings 1988*, Rockville, MD: 1990.
- National Institute on Drug Abuse, *Survey Measurement of Drug Use: Methodological Studies*, Charles F. Turner, Judith T. Lessler and Joseph Gfroerer, eds., Rockville, MD: National Institute on Drug Abuse, Division of Epidemiology and Prevention Research, 1992.
- Navaratnam, V and K. Foong. "Development and Application of a System for Monitoring Drug Abuse: The Malaysian Experience." *Bulletin on Narcotics*. Vol. XLI, Nos. 1 and 2, 1989, p. 53-65.
- Newman, Robert G. and Margot S. Cates, "The Dilemma of Addict Registries," *Drug Forum*, Vol. 5, No. 4, 1976-77, pp. 321-334.
- Office of National Drug Control Policy, *National Drug Control Strategy*, Washington, DC: U.S. Government Printing Office, 1991.
- O'Rourke, D., R.H. Dade and T. Drezner. "Trauma Triage: A Nine-Year Experience." *Annals of Emergency Medicine*. Vol. 21, No. 6, June 1992, pp. 680-687.

- Pentz, M.A., J. Dwyer, D. MacKinnon, B. Flay, W. Hansen, E. Yang, and C. Johnson, "A Multicomunity Trial for Primary Prevention of Adolescent Drug Abuse: Effects on Drug Use Prevalence," *Journal of the American Medical Association*, Vol. 261, 1989, pp. 3259-3266.
- Person, Philip H., Robert L. Retka, and J. Arthur Woodward, *Toward A Heroin Problem Index-An Analytical Model for Drug Abuse Indicators*, 1976.
- Person, Philip H., Robert L. Retka, and J. Arthur Woodward. *A Method for Estimating Heroin Use Prevalence*.
- Pollack, Earl S., "Monitoring Cancer Incidence and Patient Survival in the United States," *Proceedings, Social Statistics Section*, Washington, DC: American Statistical Association, 1982.
- Pollock, Daniel A. and Philip W. McClain, "Report from the 1988 Trauma Registry Workshop, Including Recommendations for Hospital-based Trauma Registries," *The Journal of Trauma*, Vol. 29, No. 6, 1989, pp. 827-829.
- Pollock, D.A. and P.W. McClain. "Trauma Registries." *Journal of the American Medical Association*. Vol. 262, No. 16, October 27, 1989, pp. 2280-2283.
- Pottieger, Anne E., Patricia A. Tressel, James A. Inciardi and Teri A. Rosales, "Cocaine Use Patterns and Overdose," *Journal of Psychoactive Drugs*, Vol. 24, No. 4, October-December 1992, pp. 399-410.
- Presidential Commission on the Human Immunodeficiency Virus Epidemic, *Final Report of the Presidential Commission on the Human Immunodeficiency Virus Epidemic*, Washington, DC: U.S. Government Printing Office, 1988.
- Redmond, A.D. "Drug Abuse and the Accident and Emergency Department." *Archives of Emergency Medicine*. Vol. 2, 1985, pp. 55-57.
- Regier, D.A., J.H. Boyd, J.D. Burke, B.Z. Locke, D.S. Rae, J.K. Myers, M. Kramer, L.W. Robins, D.B. Blazer, and M. Karno, "One-month Prevalence of Mental Disorders in the U.S. -- Based on Five Epidemiologic Catchment Area Sites," *Archives of General Psychiatry*, Vol. 45, No. 11, 1988, pp. 977-986.
- Retka, Robert L., "Patterns of New Drug Detection in the Drug Abuse Warning Network," *British Journal of Addiction*, Vol. 73, 1978, pp. 155-165.
- Retka, Robert L. and Gloria J. Lester, "Drug-Related Suicide: A DAWN Profile," *The International Journal of the Addictions*, Vol. 14, No. 5, 1979, pp. 509-606.

- Reynolds, Paul and Philip Eaton, "Multiple Attempters of Suicide Presenting At an Emergency Department," *Canadian Journal of Psychiatry*, Vol. 31, No. 4, 1986, pp. 328-330.
- Rhee, Kenneth J., Timothy E. Albertson, Kenneth W. Kizer, Michael J. Hughes, and Michael S. Ascher, "The HIV-1 Seroprevalence Rate of Injured Patients Admitted Through California Emergency Departments," *Annals of Emergency Medicine*, Vol. 20, No. 9, 1991, pp. 969-972.
- Rhodes, William and Douglas McDonald, "What America's Users Spend on Illegal Drugs," Washington, DC: Office of National Drug Control Policy, 1991.
- Ribbeck, Beth M., Jeffrey W. Runge, Michael H. Thomason, and John W. Baker, "Injury Surveillance: A Method for Recording E Codes for Injured Emergency Department Patients," *Annals of Emergency Medicine*, Vol. 21, No. 1, 1992, pp. 37-40.
- Rivara, Frederick P., Beth A. Mueller, Corinne L. Fligner, Gregory Luna, Vidmantas A. Raisys, Michael Copass, and Donald T. Reay, "Drug Use in Trauma Victims," *The Journal of Trauma*, Vol. 29, No. 4, 1989, pp. 462-470.
- Robins, L. and T. Przybeck, "Age of Onset of Drug Use As A Factor in Drug and Other Disorders," *Etiology of Drug Abuse: Implications for Prevention*, C. Jones and R. Battjes, eds., p. 56, Rockville, MD: National Institute on Drug Abuse, 1985.
- Rodewald, Lance E., Keith D. Wrenn and Corey M. Slovis, "A Method for Developing and Maintaining a Powerful but Inexpensive Computer Data Base of Clinical Information About Emergency Department Patients," *Annals of Emergency Medicine*, Vol. 21, No. 1, January 1992, pp. 41-46.
- Rootman, I., and P.H. Hughes, *Drug-abuse Reporting Systems*, Geneva: World Health Organization, 1980.
- Rosenbloom, L., J.W. Buehler, M.W. Morgan, S. Costa, J. Hidalgo, R. Holmes, L. Lieb, A. Shields and G.M. Whyte. "The Completeness of AIDS Case Reporting, 1988: A Multisite Collaborative Surveillance Project." *American Journal of Public Health*. Vol. 82, No. 11, November 1992, pp. 1495-1499.
- Rush, Brian and Carol Timney, "The Detection and Assessment of Alcohol-Related Problems in Health and Social Service Agencies," *Canadian Journal of Public Health*, Vol. 74, July/August 1983, pp. 270-275.
- Ruttenber, A. James, "Stalking the Elusive Designer Drugs: Techniques for Monitoring New Problems in Drug Abuse," *What Works in Drug Abuse Epidemiology*, 1991, pp. 71-87.

- Ryder, N. (1965). "The Cohort in the Study of Social Change." *American Sociological Review*, 30, 6, 843-861.
- Sanderson, M., P.J. Placek and K.G. Keppel, "The 1988 National Maternal and Infant Health Survey: Design, Content, and Data Availability," *Birth*, Vol. 18, No. 1, 1991, pp. 26-32.
- Schmidt, Laura, "A Profile of Problem Drinkers in Public Mental Health Services," *Hospital and Community Psychiatry*, Vol. 43, No. 3, March 1992, pp. 245-250.
- Sheps, S. "Components of a Minimum Data Set." *Canadian Journal of Public Health*. Vol. 80, November/December, 1989, pp. 430-432.
- Sloan, Edward P., Robert J. Zalenski, Robert F. Smith, Charles M. Sheaff, Edwin H. Chen, Niko I. Keys, Marc Crescenzo, John R. Barrett, and Eleanor Berman, "Toxicology Screening in Urban Trauma Patients: Drug Prevalence and Its Relationship to Trauma Severity and Management," *The Journal of Trauma*, Vol. 29, No. 12, 1989, pp. 1647-1653.
- Smith, David A., Lawrence Leake, James Randall Loflin and Donald M. Yealy, "Is Admission After Intravenous Heroin Overdose Necessary?" *Annals of Emergency Medicine*, Vol. 21, No. 11, 1992, pp. 1326-1330.
- Soderstrom, C.A. and P.W. Newacheck, "Access to Care for Poor Children: Separate and Unequal?" *Journal of the American Medical Association*, Vol. 267, No. 20, 1992, pp. 2756-2760.
- Soderstrom, Carl A., Anna L. Trifillis, Belavadi S. Shankar, William E. Clark, R. Adams Cowley, "Marijuana and Alcohol Use Among 1023 Trauma Patients," *Arch Surg*, Vol. 123, 1988, pp. 733-737.
- Stein, Michael D., "Medical Complications of Intravenous Drug Use," *Journal of General Internal Medicine*, Vol. 5, 1990, pp. 249-257.
- Swan, Neil, "Heroin- and Cocaine-Related Visits to Hospital Emergency Rooms Continue to Increase Nationwide," *NIDA Notes*, July/August 1992, pp. 9-10.
- Taylor, Jack, "Cocaine Overdoses Decrease," *Dallas Times Herald*, June 10, 1990.
- Teret, S.P., G.H. Wintemute and P.L. Beilenson. "The Firearm Fatality Reporting System." *Journal of the American Medical Association*. Vol. 267, No. 22, June 10, 1992, pp. 3073-3074.
- Treaster, Joseph B, "Emergency Hospital Visits Rise Among Drug Abuse," *New York Times*, April 12, 1993.
- Treaster, Joseph B, "Hospital Visits Show Abuse of Drugs is Still on the Rise," *The New York Times*, May 14, 1992.

- Turner, Charles F., Judith T. Lessler and Joseph C. Gfroerer, eds., *Survey Measurement of Drug Use: Methodological Studies*, Rockville, MD: National Institute on Drug Abuse, DHHS Publication No. (ADM) 92-1929, 1992.
- Turner, Charles F., Judith T. Lessler and James W. Devore, "Effects of Mode of Administration and Wording on Reporting of Drug Use," *Survey Measurement of Drug Use: Methodological Studies*, Charles Turner, Judith Lessler and Joseph Gfroerer, eds., Rockville, MD: National Institute on Drug Abuse, DHHS Publication No. (ADM) 92-1929, 1992, pp. 177-219.
- Ungerleider, J. Thomas, et al., "The Drug Abuse Warning Network (DAWN) Program," *Arch. Gen. Psychiatry*, Vol. 37, January 1980, pp. 106-109.
- United States General Accounting Office, *The Crack Cocaine Epidemic: Health Consequences and Treatment*, 1991.
- United States General Accounting Office, *Drug Use Measurement: Strengths, Limitations, and Recommendations for Improvement*, Washington DC, GAO/PEMD-93-18, June 1993.
- Vlahov, David, et al., "The Alive Study: A Longitudinal Study of HIV-1 Infection in Intravenous Drug Users: Description of Methods," *The Journal of Drug Issues*, Vol. 21, No. 4, 1991, pp. 759-776.
- Waldorf, Dan, Craig Reinerman and Sheila Murphy, *Cocaine Changes: The Experience of Using and Quitting*, Philadelphia, PA: Temple University Press, 1991.
- Walsh, Elsa, "Cocaine-Related Emergency Room Visits Show 22% Decline," *Washington Post*, May 15, 1990, p. A7.
- Wat, Simmy, "Central Registry of Drug Abuse," *The International Journal of the Addictions*, Vol. 20, No. 2, 1985, pp. 279-298.
- Weinstein, Stephen P., Edward Gottheil, Robert H. Smith, and Kathy A. Migrala, "Cocaine Users Seen in Medical Practice," *Am. J. Drug Alcohol Abuse*, Vol. 12, No. 4, 1986, pp. 341-354.
- Weisner, Constance, "Alcohol and Drug Problems among Diverse Health and Social Service Populations," *American Journal of Public Health*, Vol. 83, No. 6, June 1993, pp. 824-829.
- Weisner, Constance and Laura Schmidt, "Alcohol and Drug Use Among Diverse Health and Social Service Populations: Results From Comparable Epidemiologic Studies," *American Journal of Public Health*, 1993.
- Werblin, Jan Marie, "Drug-Related Hospital Admissions Decline," *The U.S. Journal*, September, 1991.

Will, George F., "The Trauma in Trauma Care," *Newsweek*, March 12, 1990, p. 98.

Williamson, D.F., M.K. Serdula, J.S. Kendrick and N.J. Binkin, "Comparing the Prevalence of Smoking in Pregnant and Nonpregnant Women, 1986 to 1986," *Journal of the American Medical Association*, Vol. 261, No. 1, 1989, pp. 70-74.

World Health Organization, *International Statistical Classification of Disease, Injuries and Causes of Death*, 10th edition, Geneva: World Health Organization, 1991.

Zellman, G.L., P.D. Jacobsen, H. DuPlessis and M.R. DiMatteo, *Health Care System Response to Prenatal Substance Use: An Exploratory Analysis*, Santa Monica, CA: RAND, N-3495-DPRC, 1992.