

# 1

## Defining and Measuring Drug Abusing Behaviors

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1. Drug Abuse: Defining the Problem	3
1.1. What is Drug Abuse?	4
1.2. Definitions	5
2. Measuring Drug Use and Abuse	6
3. Implications for Epidemiologic Studies	8
3.1. Descriptive Epidemiology	9
3.2. Analytic Epidemiology	10
4. Conclusions	11
References	12

### 1. DRUG ABUSE: DEFINING THE PROBLEM

This chapter serves as an introduction to this book and sets the stage for the other chapters that address issues related to the epidemiology of drug abuse. Over the past twenty years drug abuse formerly thought to be a major problem in the United States has become a global challenge. The introduction to a recently published guide to developing a regional integrated information system on drug use captures this idea and the importance of having epidemiological information: “Drug abuse has become a global problem requiring more comprehensive international cooperation to reduce the availability of and demand for drugs. Although

drug abuse is becoming an increasing problem for many countries, the experiences to address the problem have been largely those of the more affluent developed countries such as the United States, Canada, Australia, and those in Western Europe. Probably the most important lesson learned by these countries is that to understand their drug abuse problems and to be more efficient in addressing these problems an integrated drug information system is essential. Such a system, if well designed, not only will provide information on the types of drugs being used and the characteristics of those using them but also will generate other more focused studies to provide information that would serve to plan effective prevention and treatment programs.” (GAP Toolkit, Module 1, 2003). To develop such an information system that is a useful tool for policy decisions requires addressing key questions regarding the nature of drug abusing behaviors within the socio-political context in which they occur. This chapter lays the groundwork for understanding the relationship between these contextual influences and drug abusing behaviors.

### **1.1. What is Drug Abuse?**

The terms “drug abuse” or “drug misuse” generally include the use of substances that are considered illegal such as cocaine, heroin, and marijuana, the misuse of legal substances such as solvents, over-the-counter drugs, or prescription drugs, the abuse of tobacco and alcohol, or in the case of underage children, the use of tobacco and alcohol. Most often these substances are used for their psychoactive effects and without the supervision of a physician or other medical professional. The “legal/illegal” labels for these substances are applied through governmental legislation and regulation. In the remainder of this chapter the term “drug” will be used to describe both types of substances.

There has been a longstanding debate over whether drug use is a medical problem or a social problem; over time, it has been recognized as a public health problem. This has become particularly true during the last two decades with the growing recognition of the association of infectious diseases such as HIV/AIDS with drug abuse. There is a dearth of studies on other health consequences of drug use but those that are available show increased negative health effects among drug users. (Andreasson and Allebach, 1995; Cherubin and Sapir, 1993; Fried, 1995; Fried and Watkinson, 2000; Ghodse et al., 1998). It is not often easy to separate those effects that are related to the drugs themselves from the life styles that many drug abusers lead. However unlike other types of health issues, because of the belief in the voluntary nature of drug abuse and misconceptions held about the relative effectiveness of treatment, drug abuse has been highly stigmatized by both policy makers and the general public. As a result, acknowledgement of use or possession of illegal drugs may result in arrest, loss of job, or other sanctions. For these reasons, drug users may be reticent about disclosing drug using behaviors without assurances of confidentiality and trust.

## 1.2. Definitions

Initially drugs are used voluntarily and primarily for pleasure. It is not clear at what point in the drug-using process biological factors take over and drug abuse or dependence occurs. (Koob et al., 1998; Lyvers, 1998; O'Brien et al., 1998; Tiffany and Carter, 1998; Volkow and Fowler, 2000). The physiological basis of drug abuse and dependence is becoming better understood as our tools for brain imaging improve. Using new brain imaging technologies, such as MRI, PET, and SPECT scans, have enabled researchers to view the living human brain and to note the basic mechanisms involved and mapping what areas are affected by various substances (Volkow et al., 1991; Childress et al., 1995; Altman, 1996) providing explanations for both short- and long-term effects on cognition, memory, and movement (Block and Ghoneim, 1993; Kouri et al., 1999; Pope and Yurgelun-Todd, 1996). However, although these procedures increase our understanding of dependence, the diagnostic tools for measuring and assessing dependence are lacking. Therefore the field has adopted the diagnostic criteria established by psychiatry in the Diagnostic and Statistical Manual of Mental Disorders (DSM). These criteria are specific to individual drugs. The most current edition of DSM (APA, 1994) uses the physiological features of tolerance or withdrawal or, if either is not present, three or more of the following behavioral features: taking larger amounts of the drug over longer periods than intended; experiences of any unsuccessful effort to cut down or control the use of the drug; spending a large amount of time seeking a drug or recovering from its effects; reductions or elimination of important life activities (e.g., job, family); and, continued use of a drug despite persistent or recurrent psychological or physiological problems that are likely to be the result of or exacerbated by the use of the drug. The criteria for drug abuse applies to persons who do not meet the criteria for dependence but have experienced at least one of the following over a 12-month period: recurrent drug use resulting in failure to meet major role obligations (e.g., school, job); recurrent use in physically hazardous situations, recurrent use-related legal problems; and, continued use despite persistent or recurrent social or interpersonal problems likely to be the result of or exacerbated by the use of the drug.

Use and abuse/dependence are not just end points of a continuum of drug-using behaviors but represent a number of patterns of use with at the minimum four dimensions: type of drug used, mode of administration, frequency of use, and preferred combinations of drugs used (e.g., cocaine and heroin and marijuana and alcohol). Various researchers may disagree on what other dimensions are involved but all agree that one must initiate the use of drugs before becoming a drug abuser or drug dependent. Therefore, both cross-sectional and longitudinal studies generally ask questions about drug use initiation. These studies show that among those who initiate drug use, only a proportion will progress to abuse or become dependent. This proportion varies, depending on the type of type,

frequency of use, and the age at which drug use began (Anthony and Petronis, 1995; Coffey et al., 2000; DeWitt et al., 2000; Fergusson and Horwood, 2000; Grant and Pickering, 1998; Kandel and Chen, 2000; Kandel and Raveis, 1989; Perkonig et al., 1999).

Dependence measures, adapted from DSM-IV have been included on the National Household Survey on Drug Use and Health (NSDUH; formerly known as the National Household Survey on Drug Abuse). In the 2002 survey, it was estimated that 7.1 million or 1.8 percent of all persons using an illicit drug in the 12 months prior to survey met the survey's dependence classification. These percentages vary by age with the oldest (26 and older) and youngest age groups (12 to 17) having the lowest (1.2 percent through 3.2 percent) while those aged 18 to 25 had the highest percentage considered to be drug dependent, 5.5 percent. (OAS, 2004). Data from longitudinal studies that follow children and adolescents over time have found that adolescents are more likely to become dependent at lower levels of use than adults. (Chen et al., 1997).

While consistent information is available regarding dependence, far less research on the determinants of discontinuation or "natural cessation" of drug use has been reported. The studies that are available have found that adolescents who initiate drug use as a result of social pressures are more likely to stop such use when they mature and take on more adult roles in society.

In summary then, drug using behaviors range from drug use, including any use or misuse of a drug (as defined above), through to drug dependence, associated with either a combination of clinical and behavioral dimensions.

## **2. MEASURING DRUG USE AND ABUSE**

In the field of epidemiology measurement of a phenomenon generally has two components: the measurement and the means for measurement. For instance, if the epidemiology of hypertension within a community were of interest, then blood pressure would be measured. There are several methods for making these measurements: study subjects could self-report their blood pressure reading from their last medical check up or blood pressures could be measured using a sphygmomanometer. For drug use, there are several biological tests available to test for drug use requiring specimens such as urine, sweat, saliva, and hair. There are both advantages and disadvantages to the use of these tests. The major advantage is that these measures will provide an accurate assessment of the drugs that have been used. A major disadvantage is that it is not always known exactly what drugs are being used and the accuracy of reports depends on the level of sophistication of the study subjects and their familiarity with the drug source. Verebey and Buchan (1997) discuss these techniques in some detail. They summarize by showing

the relative advantages and limitations of each biological specimen. The drug detection time varies widely for each from 12–24 hours with saliva and up to 6 months with hair. Furthermore, there are problems with contamination and in collection methods. These tests are appropriate for some populations such as arrestees, pregnant/delivering mothers, or those in treatment where there may be serious repercussions associated with admitting to the use of illicit drugs. In addition, collecting these specimens with large general populations and processing their analysis would be cost-prohibitive; depending on the assay used (e.g., enzyme multiplied immunoassay technique, thin layer chromatography or gas chromatography) and the number of drugs to be detected; these costs can range from one to one hundred dollars. For this reason, the field has depended primarily on self-report. Drug abuse epidemiologists have addressed validity of self-reported drug use extensively. Comparisons of self-reported drug use and the results of biological tests are not consistent and vary by type of drug and by study setting (McNagny and Parker, 1992; Cook and Bernstein, 1994; Fendrich and Xu, 1994; Mieczkowski et al., 1998; Appel, P.W. et al., 2001). For instance, in a drug use survey of 627 residents aged 18 to 40 selected randomly from households in Chicago, Fendrich et al. (2004) found respondents were more likely to report marijuana use than heroin and cocaine. Consolidated drug test results showed that 78 percent of study subjects were found to have used marijuana while only 26 percent and 20 percent of those using heroin and cocaine, respectively, reported use of these drugs on the survey.

Over the three decades in which major population surveys have been conducted within households and schools, researchers have developed procedures that assure a fairly high degree of reliable and valid reporting of substance use (IOM, 1996). There is variation in self-report rates by technique and conditions of the data collection however. (Gfroerer et al., 1997; Lessler and O'Reilly, 1997). For instance, Turner et al. (1997) found that self-administered surveys yield higher rates of illicit drug use than direct or face-to-face interviews. Recent use of computer assisted interviews has demonstrated that this approach not only produces higher reported rates of use but also allows for the rapid transfer of information into a statistical database. In 2000, the Substance Abuse and Mental Health Services Administration's Office of Applied Studies changed the data collection procedures for the NHSDA to a computer-assisted administration. Unfortunately, no methodological studies were conducted to determine differential reporting comparing the face-to-face interview to the new approach.

Accepted measurements for drug using behaviors include at least two measures; type of drug and frequency of use over some time period. Most surveys ask about number of times used over one's lifetime (e.g., have you ever used an illicit drug at least once over your lifetime?), the past 12 months (e.g., have you used an illicit drug at least once in the past year/12 months?), and the last 30 days or past

month (e.g., have you used an illicit drug at least once in the past month/30 days?). For some drugs of interest, if respondents report past 30 day use, they will be asked about the number of days in the past 30 days that they used the drug to get an estimate of daily use.

In addition, for respondents reporting any lifetime use of a drug, most surveys will ask respondents about the age when they first used the drug. This information provides estimates of age of initiation and when a survey is conducted on a regular basis over time, differences in the reported age of initiation provides good age-cohort information showing how public attitudes toward drug use may be related to actual use.

### 3. IMPLICATIONS FOR EPIDEMIOLOGIC STUDIES

Reasons for making an assessment of drug use within a community or a nation may include the need to understand the types of drugs being used and the extent and pattern of such use and to monitor the emergence of new drugs of abuse or new forms of old drugs (e.g., powder cocaine and crack-cocaine), new administration patterns (e.g., smoking, snorting, inhaling, oral ingestion, injecting), or new population groups at risk for drug use (e.g., younger, higher socio-economic status, ethnicity). The health risks such as the spread of HIV from injecting drug users to the general population may prompt special epidemiologic studies.

In general, epidemiologic studies can address such questions as:

- How pervasive is substance use and abuse in our community/nation?
- Who requires treatment?
- What substances are being used and how are they used?
- What are the characteristics of those involved in such use?
- What factors seem to be associated with substance use and abuse? Do these factors differ for initiation of use from those associated with continued use?
- What circumstances in our community/nation seem to be associated with changing trends in substance use?
- What are the health, social, and psychological consequences of such use for affected individuals, their families and our community/nation?

The diversity of these questions and the means to develop the data bases needed to answer them requires multiple approaches. Generally, these approaches fall under two categories: descriptive epidemiology and analytic epidemiology. The first addresses questions 1–4 while the latter focuses on questions 5–7.

### 3.1. Descriptive Epidemiology

The measures used in general population surveys of households, students or even groups of drug abusers in treatment programs or in jail require “on the ground” information regarding the types of substances used in an area, particularly illicit substance use that includes an array of drugs. For this reason, it is recommended by most epidemiologic methods guides that communities or countries without an extensive amount of information on drug use patterns begin to explore any existing information that is readily available (NIDA, 1998; UNDCP, 2003; WHO, 2000). Such information generally includes any record data from agencies that provide services to drug users (e.g., drug abuse treatment programs, hospital emergency departments or clinics). It is also recommended that groups be formed from members of the community/nation who either specialize or have a strong interest in drug abuse and drug abusers. The United Nations calls these groups an integrated drug information system that brings together those with data or other experiences with drug abusers representing various segments of the community (e.g., law enforcement, treatment, medical services, welfare, research) to review and summarize the available information and to develop plans for future data collection efforts. Even in countries with well-developed epidemiologic data systems, such groups provide information from the “front lines” detecting emergent drug abuse patterns and therefore serve as excellent surveillance systems. A good example of such a group in the United States is the Community Epidemiology Work Group (CEWG) that has been meeting twice a year since 1974 (Sloboda and Kozel, 1999).

This type of information used in conjunction with focus groups of drug abusers or other qualitative studies lays the foundation for the development of population and school surveys. Specifically, the types of drugs that should be included in these surveys are derived from this information. For example, it was through the CEWG that the beginning of the availability of drugs such as crack-cocaine and Rohypnol were detected and included on both the National Household Survey on Drug Abuse and the national school-based survey, the Monitoring the Future Study.

Existing data or qualitative studies although extremely important to define drug use and abuse within a community/nation generally are not population based and therefore have limited utility for developing estimates of the extent of the problem, i.e., incidence and prevalence rates. In order to make these estimates, a defined population is required and standardized measures used. Household and school surveys that are administered to representative samples of the target population are better able to provide estimates of rates of new (incidence) as well as on-going users of drugs. Chapters in this book by Adlaf and Sloboda, Kozel and McKetin provide additional information about the use of existing information and surveys.

Drug abuse researchers have also developed indirect approaches to estimate the prevalence of drug use (i.e., existing cases) within a geographic area. These approaches which are based on mathematical models that describe the relationship between observed and unobserved members of a group are particularly useful with rare events such as heroin, cocaine or methamphetamine use that are underestimated on population surveys. Examples of these techniques are capture-recapture methods using closed or open populations, back-calculations, multiplier methods, event-based multipliers, modeling multiple indicators (synthetic estimation) and truncated Poisson. (Simeone et al., 2003, Gossop et al., 1994, Wickens, 1993). Each approach has its own limitations as each is based on some registry or listing of people. Comparisons against survey data for defined geographical areas demonstrate higher estimates of abusing populations. The chapter by Hickman and Taylor provides more detailed discussion of these approaches.

Data systems, that include existing record data, qualitative studies, indirect estimation procedures and surveys, when conducted on an ongoing basis, will provide sufficient information to define the drug use problem in a community/nation and to inform policies to address the emergence of new cases (prevention and availability) and to help affected drug users with both their abuse/dependence and related health and social problems (treatment). However support for these systems requires specialized training, manpower and stable funding.

### **3.2. Analytic Epidemiology**

Descriptive information about drug abuse in a community raises questions and generates hypotheses that require more focused study. This type of research is categorized as analytic epidemiology and most of this research addresses the why and how issues of drug abuse. Both quantitative and qualitative methods are used to answer these questions and the combination of methods is becoming more predominant. Qualitative studies may be used for exploratory work to refine the research questions, measurements, criteria for study populations, and data collection procedures. They may also be used to “flesh out” findings from quantitative studies by providing additional information needed to explain unexpected or inconsistent results.

The most common forms of analytic studies are either cross-sectional, longitudinal in design or some combination of both. Most of our knowledge about risk and protective factors comes from studies that follow children or adolescents over several years (e.g., Brook et al., 1997). Special population studies of more at risk groups such as street children, arrestees, the homeless, injecting drug users in or out of treatment, and pregnant women who are drug abusers provide the information on the consequences of drug use to the users themselves and to those associated with them. In most cases data for these populations are collected through questionnaires that may be self-administered or administered by a trained interviewer.



As drug abuse is a highly stigmatized behavior, researchers conducting studies among drug abusers may not always be able to use the more common sampling approaches ordinarily used in other epidemiologic studies. The inclusion of true representation of a particular population in a study when dealing with persons who are highly mobile, such as the homeless, or who wish to remain hidden has required drug abuse researchers to develop alternative approaches to defining the population universe and then selecting and engaging sample subjects from this universe for study. Probably the most well-known approaches for defining the population universe are snow-ball sampling and social network analysis. In general, these approaches begin with selected index cases asking about other people they know that are like them (i.e., use heroin, or who “do drugs” with them). These other individuals are then asked the same questions that were asked of the index case and on and on until available new contacts are exhausted. The listing of all of these contacts forms the universe of subjects and become the foundation against which a sampling frame is applied.

Once a sample is drawn the next challenge is engaging the individual into the study. Consenting procedures that may include tracking information and what to provide as incentives for participation in the study, particularly for on-going, longitudinal studies, must be carefully planned. There are a number of ethical issues related to any research regarding illegal behaviors but for special populations these issues are very sensitive. As indicated above with regards to self-reported substance use, the data collection situation can influence the degree of trust and confidence a study subject will have (Finch and Strang, 1998). Establishing such a relationship from the initial contact with an individual can make continued follow-up much easier. Interview settings should be neutral and private. Researchers need to obtain tracking information that includes relatives and friends or acquaintances of the more difficult to locate study subjects as well as identifying information such as social security numbers. If the researchers believe that they will need to search other records to locate a subject, depending on local laws and institutional review board regulations, specific consents may be required for agencies such as corrections, social service organizations, or the social security administration.

#### 4. CONCLUSIONS

Drug abuse epidemiologists have made great progress in developing methodologies to measure an elusive public health problem over the past three decades. As we learn more about the biology of dependence, particularly the process of moving from use to addiction, we in the field may be able to refine our own measurements. In addition, as was pointed out by the IOM (1996), there is a great need for more research to examine co-occurring drug use, physical and psychiatric problems, and to continue to refine our methods of data collection and data analyses.

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