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Toward the Year 2000

Monitoring Trends in Drug Use: Strategies for the 21st Century

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ABSTRACT

Since the 1970s the United States and other nations have conducted regular statistical monitoring of the prevalence and patterns of drug use in their populations. Given the importance of such surveys for policymaking, their quality is a critical issue, and the biases that may affect their measurements become a major concern. An increasing volume of empirical evidence shows that the mode of administration of a survey can strongly influence the validity of respondents' reports. Compared with interviewer-administered questionnaires, self-administered forms appear to elicit more complete reporting of drug use, but the challenges they pose to the literacy skills of respondents may result in measurement biases. In addition, processes of social change may confound true shifts in drug use with changes in the willingness of respondents to report such use. The authors propose several strategies to improve monitoring of trends in drug use. Those approaches include 1) more frequent use of a survey technology—audio computer-assisted self-interviewing—that ensures full privacy for all survey respondents but does not require literacy; 2) increased use of time-series of indicators of drug use consequences built from blinded surveys of medical records; and 3) population-based surveys that collect biological specimens (e.g., hair samples). Data from the latter two

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sources are not subject to the same constellation of biases that afflict self-reports of drug use. Time-series of those data can be integrated with self-reports to provide a better understanding of changes over time in the prevalence and patterns of drug use.

Key words. Survey measurement; Drug use; Audio-CASI; Medical records; Biological specimens; Survey methods

INTRODUCTION

During the second half of the 20th century, the United States and other nations have committed substantial resources to regular statistical monitoring of the prevalence and patterns of drug use in their populations. Those survey research programs, which were launched in the 1970s, expanded the techniques developed in the 1930s for tracking unemployment and voter preferences and applied them to measuring the use of drugs. Such measurements have been used for a variety of purposes beyond tracking the levels and patterns of drug use—for example, to estimate the extent of resulting medical consequences, determine the need for drug-user-treatment services, and assess the effectiveness of those services.

Given the importance of such surveys, their quality is a critical issue, and the biases that may affect their measurements become a major concern. Furthermore, for a complete picture of the problem, data collected in surveys need to be integrated with data from monitoring that uses research tools unafflicted by the biases that affect survey measurements. In this brief note we review those concerns and suggest some ways to improve our ability to monitor changes in the prevalence and patterns of drug use in national and other large populations.

Problems in Monitoring Drug Use through Surveys

An increasing volume of empirical evidence shows that the validity of survey reports of drug use is strongly influenced by the context in which those measurements are made (see Note 1). For example, a large-scale experiment recently demonstrated that estimates of the use of cocaine can vary more than twofold, depending on whether the questions are administered by an interviewer or are self-administered (Turner et al., 1992a). Moreover, the relative advantage of self-administered questionnaires (SAQs) in eliciting more complete reporting of drug use appears to be a direct function of the sensitivity of the behavior being reported. Differences in reporting by mode of administration are more pronounced for cocaine use than for marijuana use; virtually no

difference is found in reports by adults of their use of alcohol. Furthermore, reporting of recent drug use shows a dramatically larger difference across modes than does reporting of use in the distant past.

Although such findings support the widespread use of SAQs, that method of data collection is only feasible if respondents can handle the challenges it poses. Respondents with limited reading skills and even some literate respondents may have problems navigating through the complex skip patterns characteristic of such instruments. In the United States the proportion of respondents who require and receive help from interviewers to complete an SAQ is not inconsequential, which has serious implications for studies that administer questions in that way. Because they receive assistance, respondents who have limited reading skills will not undergo the same interview process as respondents who can read well. The resulting bias in their responses can produce an artifactual correlation between drug use and sociodemographic and other characteristics associated with literacy. As a consequence, there may appear to be differences in drug use across subpopulations when what is actually varying is their level of literacy—and hence the modes of administration that were used and the attendant response biases.

In addition to this practical limitation on contemporary survey measurements, the processes of social change introduce more difficult problems. Because societal acceptance of drug use has changed over time, shifts in use are confounded with changes in the willingness of respondents to report such use. In other words, the magnitude of the reporting bias in survey measurements of drug use will vary with the level of societal tolerance (or intolerance) of the use of drugs. That same factor also influences the actual prevalence of use. The resulting confounding spawns an extremely difficult measurement problem for researchers who want to disentangle changes over time in drug use from changes in the measurement biases that affect these survey estimates.

STRATEGIES FOR IMPROVING MEASUREMENTS

We propose three strategies to start addressing that problem:

- More frequent use of survey technologies that assure full privacy for all survey respondents and thus encourage accurate reporting
- Routine collection of administrative data (such as records of medical treatment) and biological specimens, which are not subject to the same constellation of biases that afflict survey measurements
- Systematic attempts to model over time the trends in drug use that are tracked by these different types of indicators

Using Audio-CASI to Encourage Accurate Reporting

If changing the mode of survey administration can double estimates of recent use of cocaine, it would make sense to rely on technologies that circumvented the requirement that respondents divulge information about their drug use to a human interviewer. In a new interview system, audio computer-assisted self-interviewing (audio-CASI), a computer plays digitally recorded versions of the survey questions (Turner et al., 1992b; O'Reilly et al., 1994; Cooley and Turner, 1996; Cooley et al., 1996). Respondents listen to the questions on earphones, in private, and enter their answers using a keyboard or a mouse. The computer then records the response and plays the next appropriate question. (A parallel system has been developed and tested for use in telephone surveys; see Turner et al., 1996).

Audio-CASI offers several methodological advantages compared with other modes of administering surveys on sensitive behaviors. It does not require literacy, and it can administer surveys in any language (see Note 2). It also provides a completely standardized measurement system: every respondent hears the same question asked in exactly the same way. In addition, the system has all of the other features of computer-assisted interviewing including computer-controlled branching through complex questionnaires, automated consistency and range checks, and automatic production of data files. Furthermore, preliminary results indicate that this new technology can have dramatic effects on reporting of sensitive behaviors. Data from the first 927 cases of the National Survey of Adolescent Males, for example, show that respondents were four times as likely to admit having male-male sexual contacts when interviewed using audio-CASI as when interviewed using a paper-and-pencil SAQ (Turner et al., 1996a) (see Note 3).

Collecting Biological Specimens to Monitor Drug Use

An alternative to relying on respondents' reports of their use of drugs is to obtain biological specimens, which are subject to different kinds of biases from those that apply to self-report. Recent experience with urine collections in surveys of young men ages 18 to 25 (Ku et al., 1997) suggests that it should be possible to obtain such specimens from the vast majority of targeted respondents—provided the respondents are given iron-clad guarantees of anonymity and suitable monetary incentives. Marrying urine collection to household surveys of probability samples of the population holds the theoretical promise of developing estimates of drug use prevalence that are not subject to the same reporting bias as survey measurements. However, that promise is compromised by two factors. First, assays of urine samples are reliable only for relatively

recent drug use (1 to 3 days). Second, and more problematic, are the difficulties posed by differential nonresponse to the request for a biological specimen. Differential nonresponse among users and nonusers of drugs will bias prevalence estimates. Moreover, changes in nonresponse bias over time can be expected to occur for the same reasons that changes in response bias occur, and they are likely to have parallel effects.

These problems, though substantial, are not insurmountable. Hair samples, for instance, can provide evidence of drug use beyond the time frame allowed by urine specimens. (A burgeoning literature examines the reliability and validity of the assays used for detecting drugs in hair samples.) (See Note 4.) Similarly, "blinded" testing has come into wide use to obtain data of the most sensitive types (e.g., HIV serostatus) while avoiding so-called volunteer bias. In such testing, researchers remove all identifiers from the biological specimens prior to testing. (They may, however, retain simple demographic information coded in broad categories, such as "age: 10-29," and so forth.) The subsequent test results cannot be linked to any individual; nevertheless, they provide population-based estimates of prevalence that are not subject to response or volunteer bias. If drug-use researchers could obtain hair specimens in a similar manner from samples of well-defined populations, they could track the prevalence and types of drug use in those populations over time.

For personal interview surveys, researchers should consider joining these blinded collections of unlinked biological specimens with routine collections of survey data. As an illustration, they might ask respondents for a lock of hair, which would be placed in a plastic container with no labeling beyond broad demographic categories. The container would then go into a large bag with dozens of other samples, and the respondents themselves would mix up the samples in the bag to make it impossible to identify a particular sample. Although we cannot be sure whether such procedures would allay respondents' fears completely, we believe that much could be gained by applied research on conditions and procedures that provide enough reassurance to minimize non-response and make such measurements feasible.

Using Administrative Records for Monitoring

A promising complement to these approaches stems from the ever-increasing computerization of medical and other records. As Saxe and colleagues (1996) argued, it should be possible to construct valuable indicators of drug use by systematically culling mortality statistics and hospital discharge records to monitor alcohol- and drug-use-related deaths and hospitalizations (see Note 5). The biases in those time-series data would be quite different from the biases adhering to reports of drug use made to a survey interviewer or those

attending a method in which respondents provided a biological specimen for blinded testing. Access to health care, the willingness of physicians to code patients' medical records for drug use, the completeness and accuracy of medical record systems, and other factors will introduce error and bias into a monitoring system built solely on administrative records. However, using such a system *in tandem with other approaches* may give researchers a more accurate view of underlying trends in the prevalence of drug use in the population, trends that are measured with different biases by each data source.

Integrating Data from Several Sources

Finally, we need more systematic approaches to monitoring the patterns of drug use reflected in survey measurements, biological indicators, and administrative records. Different modes of analysis and different styles of interpretation are both required. We believe that too much emphasis is now placed on reporting that "Use of drug X has increased (or decreased)," based on the results of a single survey program. Such inferences are extremely vulnerable to errors induced by measurement biases.

In the United States there appear to be enough different kinds of data to begin constructing models that integrate multiple population-based measures of the prevalence and patterns of drug use (see, for example, Larson et al., 1995). As a point of departure, such models might begin by incorporating time-series data from:

- Two large-scale survey measurement programs that annually track self-reported drug use among the national population age 12 and older (SAMSHA, 1995a) and among the national population of high school students (Johnston et al., 1995)
- A new survey program or an existing one amended to incorporate blinded testing of biological specimens (e.g., hair samples) from probability samples of the national population
- National mortality records that provide an annual census of deaths (coded for multiple causes) that can be used to identify trends in drug-related deaths
- Annual national samples drawn for 1) the National Hospital Discharge Survey ($Ns = 274,000$ per year), 2) the National Hospital Ambulatory Medical Care Survey ($Ns = 70,000$ per year), and 3) the National Ambulatory Medical Care Survey ($Ns = 40,000$ per year) to identify trends in drug-related medical conditions wherever they were treated
- Annual special-purpose surveys of drug-related cases seen in a national sample of hospital emergency rooms (SAMSHA, 1995b) (see Note 6)

Each of those measurement systems can provide a snapshot of trends in an important aspect of drug use, and each system has its own error structure. But it is reasonable to suspect that those structures are substantially independent of each other. As a result, inferences about trends in drug use that synthesize data from all four systems should be considerably more robust than those that use only a single indicator.

We thus urge efforts to understand the historical interrelationship of indicators derived from the extant monitoring systems as well as efforts to develop synthetic indicators that draw on those multiple data sources (see Note 7). If these activities yield better indicators, we would also encourage renewed investigation into the ways in which trends in the use of drugs over time relate to variations in economic, social, and cultural conditions. Such work, we believe, will provide a more solid basis for future scientific understanding of drug use and its causes.

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NOTES

1. See, for example, Gfroerer and Hughes (1992), Jones and Forrest (1992), Shober et al. (1992), Turner et al. (1992a), Aquilino (1994), Turner et al. (1995).
2. Pilot tests suggest that this technology may permit multilingual surveys without demanding a large staff of multilingual field interviewers (Hendershot et al., 1996; Turner et al., 1996c).
3. The higher estimates are thought to be less biased because many more adult men retrospectively report having had male-male sexual contacts during adolescence, compared with the smaller number of males who report such contacts in surveys conducted during adolescence (Turner et al., 1995).
4. See, for example, Cone et al. (1993), Kalasinsky et al. (1993), Welch et al. (1993a, 1993b), Feucht et al. (1994).
5. These indicators will not provide population prevalence estimates because the denominator may include multiple admissions by the same individual. That circumstance does not, however, diminish their usefulness in monitoring trends over time.
6. Although the Drug Abuse Warning Network (DAWN) was converted to a national probability sample in 1988, there have been reports of anomalies in the sample execution and data collection procedures (see SAMSHA, 1995b: 42-44). Standardization of measurements in that system has also been thought to be incomplete, although revisions are under way. As Larson et al. (1995: 19) note, "Although standard instruction manuals and training are provided to each DAWN reporter, the specific methods and procedures used to identify [drug abuse] episodes may vary from facility to facility."

7. This exhortation is not meant to detract from the important work done in modeling the use of particular drugs (for example, heroin) using other data sources, such as DAWN (e.g., Cooley et al., 1989), or in past uses of data from the Hospital Discharge Survey that have focused on economic impacts (e.g., Fox et al., 1995).

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RESUMEN

Desde la década de los 70s, los Estados Unidos y otras naciones han conducido regularmente el monitoreo estadístico de la prevalencia y patrones del uso de drogas dentro de sus poblaciones. En base de la importancia de estas encuestas

para la toma de decisión política, la calidad de los datos y los sesgos que afectan las medidas son asuntos críticos. La cantidad de pruebas empíricas muestra que el modo de realizar una encuesta puede influir la validez de las respuestas. Relacionado con instrumentos administrados a través de encuestadores, los instrumentos contestados por sí mismo sacan datos más completos sobre el uso de drogas, pero los desafíos que tienen hacia la capacidad de leer del encuestado pueden resultar en sesgos de medición. También, los procesos de cambio social pueden confundir cambios verdaderos en el uso de drogas con cambios en la disposición a reportar tal uso. Los autores proponen varias estrategias para mejorar el monitoreo de patrones en el uso de drogas. Entre las estrategias son: (1) el uso más frecuente de una tecnología que asegura la privacidad completa del encuestado y que no requiere la capacidad de leer—autoentrevista con asistencia audio de la computadora (A-CASI); (2) el uso aumentado de indicadores de serie de tiempo obtenidos a través de encuestas anónimas de historias médicas sobre las consecuencias del uso de drogas; (3) encuestas en base de la población que recogen especímenes biológicos (como pelo humano). Datos obtenidos a través de las dos últimas fuentes no tienen los mismos sesgos que afectan los datos sobre el uso de drogas como los reportados por la persona misma. Serie de tiempo puede estar integrada con datos reportados por la persona misma para conseguir una comprensión mejor de los cambios longitudinales en la prevalencia y los patrones del uso de drogas.

RÉSUMÉ

Depuis les années soixante-dix, les Etats-Unis et d'autres pays ont conduit des surveillances de statistiques régulières des fréquences et des modèles de l'utilisation des drogues dans leurs populations. Donnée l'importance de telles enquêtes pour faire les déclarations de principe, la qualité est un sujet crucial et les préjugés qui peuvent affecter les résultats deviennent une affaire importante. L'évidence empirique de plus en plus grande montre que la façon de l'administration d'une enquête peut influencer fortement la validité des réponses. En comparaison des enquêtes passés avec un enquêteur, les questionnaires complétés à soi-même semblent obtenir des reportages plus complets de l'usage des drogues, mais le degré d'alphabétisation des sujets pose des problèmes de préjugés dans ces résultats. De plus les processus de changements sociaux peuvent confondre les vrais changements de l'utilisation des drogues avec une diminution dans le volonté des sujets de rapporter ces nouvelles utilisations. Les auteurs proposent plusieurs moyens d'améliorer la surveillance des nouveaux mouvements dans l'usage des drogues. Ces moyens sont (1) l'utilisation plus fréquent d'une mode d'enquête qui s'appelle—audio computer-assisted self-interviewing—Audio-CASI—(l'entretien à soi-même assisté à

l'ordinateur et acoustique) où la vie privée de chaque sujet est assurée, mais où il ne faut pas savoir lire ni écrire; (2) l'utilisation plus fréquent des séries de temps des indications des conséquences de l'usage des drogues avec les enquêtes masquées des dossiers médicaux; et (3) les enquêtes de la population où des spécimens biologiques sont collectionnés (par exemple des échantillons de cheveux). Les données collectés par la deuxième et troisième moyens ne sont pas sujet aux mêmes préjugés qui peuvent avoir un effet sur les reportages à soi-même de l'usage des drogues. Les séries de temps de ces données peuvent être intégrées avec les reportages à soi-même pour obtenir une meilleure compréhension des changements au cours de temps des fréquences et des modèles de l'usage des drogues.

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