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# ASSESSING THE PREVALENCE OF ILLICIT DRUG USE IN THE ARMY

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and

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SOCIAL PROCESSES TECHNICAL AREA

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20. ✓ social problem in which most individuals vary their patterns and levels of drug use with circumstances. \

The questionnaire was administered March-June 1973 to personnel in TO&E units in the U.S., Germany, and Korea. Usable responses (71% of total responses) were returned from 17,141 enlisted men, E1-E5, from 398 units. A test-retest procedure indicated sufficient reliability for the questionnaire, which asked respondents to indicate frequency of recent use (daily; 15-30, 7-14, 3-6, 1-2, or 0 days "last month") for alcohol, marijuana, hallucinogens, amphetamines (A), barbiturates (B), other sedatives, cocaine, methadone (M), and other opiates (O).

Percentages of laboratory drug positives for A, B, M, and O from urinalysis were aggregated separately for TO&E units from six posts in the U.S. and a division in Germany, for the periods including and symmetrically bracketing the date the questionnaire was given in each area. These figures were compared with the percentage of positives which could be statistically predicted from the self reports (adjusting for the occasional user's vulnerability to urinalysis detection).

↘ The questionnaire indicated that 40% of the respondents had used marijuana within the previous month and 21% daily or every other day; 80% had used alcohol within the month and a third daily or every other day. Reported use of harder drugs within the month ranged from 15% (A) to 3% (M); reported daily or alternate-day use ranged from 2.4% (A) to 1% (M). Frequent use of hard drugs seems much less common than occasional use.

Percentages of lab positives (urinalysis) were about a third of the percentages predicted statistically from self reports. However, the great variation over installations and drug types suggests that more than simple self-report exaggeration is involved; biochemical and operational factors suggest that urinalysis data do underestimate actual use. A base commander's interest in deterring drug abuse on his post and in identifying and treating habitually heavy users would encourage use of random urinalysis. Headquarters commanders who want a reasonably accurate estimate of illicit drug use patterns and prevalence generally may be better served by use of a brief anonymous self-report questionnaire.

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## FOREWORD

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The Social Processes Technical Area of the Army Research Institute (ARI) is concerned with problems of social dynamics and interactions to help the soldier better adjust to the modern Army, to provide field commanders with techniques to increase unit competence, and to provide information to headquarters commanders on which they can appropriately base their decisions. Programs in the Technical Area deal with systematic research over wide areas and with immediate and specific problems, in this case the use of illicit drugs in the Army.

The present research was part of a larger effort designed to identify social and organizational differences between units with high drug use rates and those with low drug use rates. A necessary first step in this effort was to develop an index of drug use prevalence on which units might be compared. The purpose of the research reported in this Technical Paper was to examine a number of potential indicators of illicit drug use and to select or develop a reliable and valid method of estimating drug use prevalence. Work was conducted under Army RDTE Project 2Q163101A752, "Drug Abuse and Discipline," FY 1974 Work Program. Research is conducted as an in-house effort augmented by contracts with organizations selected as having unique capabilities in the area of drug research. The present study was conducted jointly by personnel of HRB-Singer, Incorporated and the Army Research Institute, and is responsive to special requirements of the Director of Human Resources Development, Office of the Deputy Chief of Staff for Personnel of the U.S. Army.



J. E. UHLANER,  
Technical Director

# ASSESSING THE PREVALENCE OF ILLICIT DRUG USE IN THE ARMY

## BRIEF

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### Requirement:

To assess the prevalence of illicit drug use in the Army, and, to that end, examine potential indicators of illicit drug use and select or develop an accurate method of estimating drug prevalence.

### Procedure:

Random urinalysis (the basis of most official Army prevalence estimates) and brief anonymous self-report questionnaires were used to gather data. Urinalysis is a logical indicator of drug abuse in a system in which individuals must be identified to be cured; a questionnaire is an equally logical indicator of drug abuse as a complex social problem in which most individuals vary their patterns and levels of drug use with circumstances.

A brief self-report questionnaire was administered March-June 1973 to personnel in TO&E units in the U.S., Germany, and Korea. Usable responses (71% of total responses) were returned from 17,141 enlisted men, E1-E5, from 398 units. A test-retest procedure indicated sufficient reliability for the questionnaire, which asked respondents to indicate frequency of recent use (daily; 15-30, 7-14, 3-6, 1-2, or 0 days "last month") for alcohol, marijuana, hallucinogens, amphetamines (A), barbiturates (B), other sedatives, cocaine, methadone (M), and other opiates (O).

The percentages of laboratory drug positives for A, B, M, and O from urinalysis were aggregated separately for TO&E units from six posts in the U.S. and a division in Germany, for the periods including and symmetrically bracketing the dates the questionnaire was given in each area. These figures were compared with the percentage of positives which could be statistically predicted from the self reports (adjusting for the occasional user's vulnerability to urinalysis detection).

### Findings:

The use questionnaire indicated that 40% of the respondents had used marijuana within the previous month and 21% daily or every other day; 80% had used alcohol within the month and a third daily or every other day. Reported use of harder drugs within the month ranged from 15% (A) to 3% (M); reported daily or alternate-day use ranged from 2.4% (A) to 1% (M). Frequent use of hard drugs seems much less common than occasional use.

Percentages of lab positives (urinalysis) were about one third of the percentages predicted statistically from self reports. Although both methods carry some error, it is possible that either the self reports were inflated or that urinalysis produced underestimates. The self-report prediction of opiate use was 2.7 to 7.7 times greater than the lab reports of opiates, depending on the installation; reported barbiturate use was 2 and 1.5 times greater respectively at the same posts, and methadone use 14 and 3 times greater. This amount of self-report variation suggests that more

then simple exaggeration is involved; biochemical and operational factors suggest that urinalysis data do underestimate actual use.

Urinalysis reports may be either chemical lab positives or confirmed positives which eliminate as many as 50% (false positives caused by prescription use and error and possibly some true positives). The percentage of men actually using identifiable drugs in a given period will be greater than the percentage of chemical positives for that period since the sporadic user will not test positive the entire time.

In self reports of drug use the user may not know what he has been using, may be afraid to tell, and may lie or exaggerate. However, earlier studies suggest that anonymous self-report questionnaires may be better than any currently available method for estimating prevalence and patterns of illicit drug use, in spite of the remaining bias from exaggeration and uncertainties of drug identity and recall. Self-report methods appear to be less sensitive than urinalysis to systematic variations in enforcement practices, and their bias appears relatively constant across posts and commands.

#### Utilization of Findings:

A base commander's interest in deterring drug abuse on his post and in identifying and treating habitually heavy users would encourage use of random urinalysis. Headquarters commanders who want a reasonably accurate estimate of illicit drug use patterns and prevalence generally may be better served by use of a brief anonymous self-report questionnaire. The use of recently developed urinalysis methods (e.g., radioimmunoassay) which are considerably more sensitive than those used during this study is not likely to alter this situation significantly.

# ASSESSING THE PREVALENCE OF ILLICIT DRUG USE IN THE ARMY

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## ASSESSING THE PREVALENCE OF ILLICIT DRUG USE IN THE ARMY

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Assessing the prevalence<sup>1</sup> of illicit drug use is fundamental to both the operation of a drug control program and the performance of research on the problem. By accurately depicting the magnitude and patterns of drug use, prevalence estimates can clarify the nature of the problem and can permit the evaluation of efforts to reduce illicit use. However, accurate prevalence estimates are difficult to develop.<sup>2,3</sup>

The potential sources of error are so manifold that one researcher recently stated that the "actual number of new or current drug abusers anywhere in the United States is a matter of gross speculation."<sup>4</sup> In recent years, the military has attempted, using several different methods, to estimate the prevalence of illicit use in the services. In 1971 and 1972 the Department of Defense employed the questionnaire survey method to assess the level of illicit drug use in the armed services.<sup>5,6</sup> Although the Army has also conducted surveys to determine drug use rates, official estimates of drug use prevalence have typically been based on random urinalysis.<sup>7</sup> In addition to these two major ways of deriving prevalence estimates, potential indicators are arrest records, exemption

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- <sup>1</sup> The term prevalence is used rather than incidence in conformance to the literature, which uses prevalence to refer to the number of cases on hand at a given moment in time and incidence as the number of new cases that come into being during a specified period of time.
  - <sup>2</sup> Ball, J. C., and Chamber, E. C. The epidemiology of opiate addiction in the United States. Springfield, IL: Charles C. Thomas, 1970.
  - <sup>3</sup> Berg, G. H. Illicit use of dangerous drugs in the United States: A compilation of studies, surveys, and polls. U.S. Department of Justice, 1970.
  - <sup>4</sup> Lavenhar, M. A. The drug abuse numbers game. American Journal of Public Health, 1973, 63(9).
  - <sup>5</sup> Fisher, A. H., Jr. Preliminary findings from the 1971 DoD survey of drug use. Human Resources Research Organization, Technical Report 72-8, March 1972. (AD 743 852)
  - <sup>6</sup> Fisher, A. H., Jr. Major findings from the 1972 survey of drug use. Human Resources Research Organization, draft report, May 1973.
  - <sup>7</sup> Review of military drug and alcohol programs. Hearing before the Subcommittee on Drug Abuse in the Military Services. Washington, DC: U.S. Government Printing Office, 1973.

application rates, and clinical records of drug use identification incidental to medical identification.

The present research was part of a larger effort designed to identify social and organizational differences between units with high drug use rates and those with low drug use rates. A necessary first step in this effort was to develop an index of drug use prevalence on which units might be compared. The purpose of the research reported in this paper was to examine number of potential indicators of illicit drug use and to select or develop a reliable and valid method of prevalence estimation. Of specific interest was the comparison of the urinalysis method of prevalence assessment with the self-report questionnaire method.

#### POTENTIAL SOURCES FOR ESTIMATING DRUG ABUSE PREVALENCE

##### Arrest Records

Since not everyone who breaks a law is caught, arrest records might provide at best an estimate of comparative prevalence. Enforcement rigor of any law is variable, and that of drug laws seems to be especially so. Nevertheless, an initial step was to compare arrest levels in various Army jurisdictions to see if such data would reinforce the more sensitive indices, at least to help identify "high" and "low" drug-abuse units.

The combined incidence of Provost Marshal arrests and Article 15's for drug charges proved to be far too low to aid in identifying "high" and "low" abuse units. Indeed, for the harder drugs, it is doubtful whether comparative arrest records would even discriminate between major commands--even with the totally untenable assumption of no bias due to differences in such matters as reinforcement rigor.

##### Exemption Applications

Although some drug users have applied for admission to drug programs, not every illicit drug user will do so. At any rate the incidence of exemption applications may well be a better reflection of the program's attractiveness than it is of drug abuse. Consequently, this data source was not pursued.

## Identification Incidental to Medical Treatment

In general, such identification occurs too seldom to be used as an indicator. As with arrest and exemption rates, the comparative incidence in this category may be more a function of administrators' philosophies than of drug use. Also, there are further sources of bias: e.g., when high-grade heroin is cheap and readily available, it is usually smoked or sniffed instead of injected, and the likelihood of identification through needle tracks, abscesses, or infection decreases.

## Urinalysis

Random vs. Scheduled Urinalysis. Random urine tests have one ideal attribute for the purposes of this research: The exposure base (total sample population) is known. Thus, percentages can be calculated in relation to the population. Scheduled urinalyses are less useful. When the approximate test time is known in advance (as DEROS from South-east Asia), there is obvious reason to believe that it will not be fruitful. Alternatively, the tendency to order a surprise urinalysis may reflect a high level of zeal in deterring drug abuse; those who order such tests most frequently may tend to be those who make the greatest overall deterrent efforts via shakedown inspections, disciplinary actions, etc. One cannot assume that the detection percentages from such tests are comparable as epidemiological indicators to those from random tests. The exposure base may look the same but in reality it is not.

In addition to providing a known exposure base, the random testing program has the desirable attribute of results which are relatively objective in that they reflect chemical analyses performed by specified techniques. Consequently, random urine tests were included as one of the comparison sources.

Chemical Positives vs. Confirmed Positives. For estimating drug abuse prevalence, reliance on confirmed positives has the obvious advantage of eliminating those false positives that occur because of either (a) legitimately prescribed use, or (b) laboratory or administrative error. A disadvantage is that a non-confirmed chemical positive may represent a true incident of drug abuse.

When a chemically positive result is reported by a testing laboratory and the donor has no prescription to account for it, the Medical Officer may nevertheless find no definite clinical signs of drug abuse. A social evaluation is then performed, utilizing joint inputs from counselors, etc., and the Medical Officer. If the social evaluation fails to confirm drug abuse, in the opinion of the Unit Commander, the donor is then required to undergo urinary surveillance for a period of 8 weeks, providing three samples per week. If he completes this cycle without any positive urines, he is then "disconfirmed" and the original chemical positive is considered a false positive. A flow chart of the entire procedure is given in Figure 1.

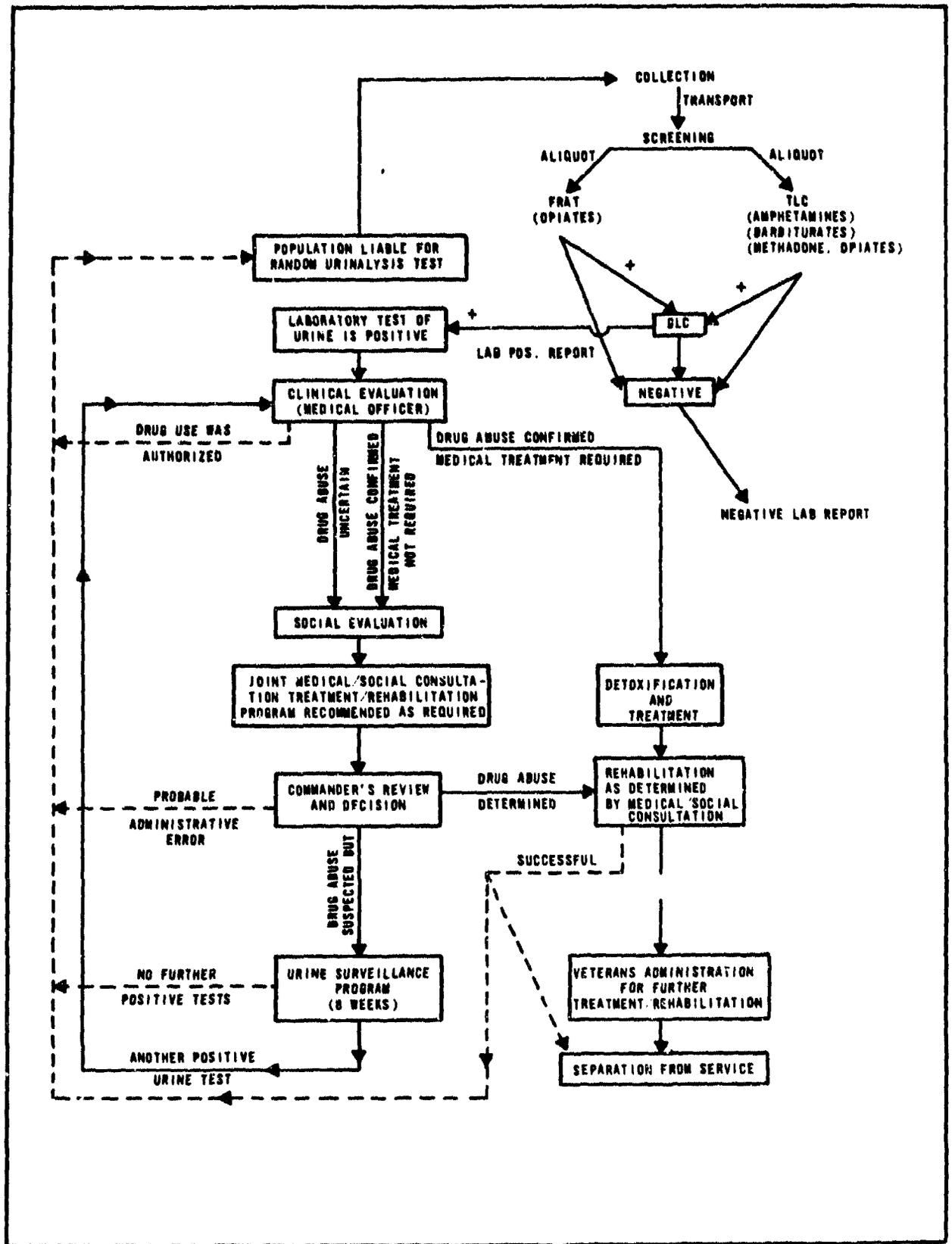


Figure 1. Flow chart of confirmation procedures

Of course, someone who really had illicit drugs in his urine at the time of the original random test may very possibly be able to stay clean for eight weeks. It is also possible that he may convince the Medical Officer, on whatever basis, that he has been falsely identified, and the test is disconfirmed without urinary surveillance. Hence, there are reasons to believe that many nonconfirmed chemical positives are true instances of illicit drug use. The confirmation rate for the Army during the period when our data were collected was considerably less than 50%. Recent quality-control data from the Armed Forces Institute of Pathology (AFIP) indicate that very few negative urine samples are identified as drug positive due to laboratory error. As to "authorized use," there are reasons to doubt that such cases can properly account for the low proportion of laboratory positives that are confirmed. Amphetamine, for example, is now appropriately prescribed only for narcolepsy and certain childhood behavioral disturbances.

The chemical positives themselves are not without deficiencies as a data source. First, the types of drugs covered are inherently limited. Theoretically, the combined thin layer chromatography (TLC) and free radical assay technique (FRAT) for preliminary screening will pick up a large variety of drugs, since they are not intended to avoid false positives--chemical confirmation by gas-liquid chromatography (GLC) is needed before a laboratory positive result is reported as "chemically positive." Only a few substances, such as cannabis derivatives (marijuana) and LSD, should be missed. However, quality-control procedures by AFIP check only for morphine, amphetamine, and some common barbiturates. A FRAT positive for morphine would be expected if the donor had consumed "opiate" drugs such as opium, heroin, or morphine. Most synthetic "opioids" such as meperidine (Demerol) and propoxyphene (Darvon) would be missed and would have to be detected by TLC, as is methadone. Although the laboratory reporting form contains a "methadone" category, the ability to detect methadone is not quality-controlled by AFIP.

A second deficiency is the known contribution of false chemical positives. The AFIP quality-control statistics cited above indicate a probability of about 0.0044 that a true negative will be identified as chemically positive. However, particularly interesting is the probability that a sample identified as chemically positive was in fact negative and did not contain the drug in question. (This is also the concern of the examining physician.) These two probabilities are not generally the same and can be quite different, since the second is the inverse of the first. It was decided to define the probability of a "false positive" in this second sense: that a given laboratory-reported chemical positive came from a sample specimen that did not contain the drug reported. This probability (the expected proportion of true negatives among a reported set of lab positives) is defined by Bayes' Theorem as:

$$P(N|+) = \frac{P(N) P(+|N)}{P(+)} \quad (1)$$

where  $P(N)$  = prior probability of a true negative [proportion of true negatives in the population, considered as those urines that do not contain opiates (O), amphetamines (A), or barbiturates (B)]<sup>2</sup>

$P(+)$  = probability of a lab positive (proportion of all lab tests reported "positive" for O, A, and/or B in the population)

$P(+|N)$  = probability of positive lab report given that neither O, A, or B is present in sample

$P(N|+)$  = probability that a reported lab positive is false (proportion of reported lab positives that do not, in fact, contain O, A, or B)

Of the required estimates,  $P(+|N)$  can be based on AFIP quality control statistics.  $P(+)$  is simply the proportion of all lab tests reported positive in the population sampled. It remains to estimate  $P(N)$ , the true proportion of negatives in the population. To do this, we must introduce an additional term:

$P(+|D)$  = probability that a positive lab report will be received on a sample containing O, A, or B at the required concentration. This can be estimated from AFIP data.

$P(N)$  is calculated as follows:

$$P(+)= P(D) P(+|D) + P(N) P(+|N)$$

$$P(D) = 1 - P(N)$$

$$P(+)= [1 - P(N)] P(+|D) + P(N) P(+|N)$$

$$P(+)= P(+|D) + P(N) [P(+|N) - P(+|D)]$$

$$P(+)- P(+|D) = P(N) [P(+|N) - P(+|D)]$$

$$P(N) = \frac{P(+)- P(+|D)}{P(+|N) - P(+|D)} = \frac{P(+|D) - P(+)}{P(+|D) - P(+|N)} \quad (2)$$

<sup>2</sup> The methadone category is omitted from the calculation because the necessary quality control data are not available and not all laboratories test for it.

Substituting this estimate of P(N) in Equation (1),

$$P(N|+) = \frac{P(+|N) [P(+|D) - P(+)]}{P(+)[P(+|D) - P(+|N)]} \quad (3)$$

Recent AFIP estimates (1st 3 quarters 1973, all labs combined) are:

$$P(+|N) = 0.0044$$

$$P(+|D) = 0.873$$

Now, suppose that a given population has 4% chemically positive tests:

$$P(+) = 0.04$$

Substituting these three values in Equation (3),

$$P(N|+) = \frac{0.0044 (0.873 - 0.04)}{0.04 (0.873 - 0.0044)}$$
$$P(N|+) = \frac{0.00366}{0.0347} = 0.105 \quad (4)$$

Thus, the chance that a reported lab positive is false in this population is about 10% rather than 0.44%, the false positive rate for true negatives. This risk factor will vary between populations because it is a function of P(D), the true chemical positive rate. In this particular example, P(D) is estimated at .442, P(N) = 0.558 from Equation (2).

In summary, chemical positives should be able to provide good relative estimates of drug abuse rates for certain opiates, amphetamines, and barbiturates (O, A, and B).

The percent of chemical positives cannot be expected to equal the percent of personnel using O, A, and/or B during a given month, since the occasional user will not have a positive urine the entire time. Chemical positives will provide a good relative estimate of drug abuse rates if three conditions are met:

1. Prescribed use is involved in only a small proportion of true chemical positives, or is relatively constant between populations that are to be compared.
2. The incidence of false positives P(+|N) from AFIP reports is not grossly biased by the fact that AFIP negative samples are "blanks," i.e., do not contain over-the-counter cold remedies, etc.
3. Random urinalysis is done "by the book," i.e., less than eight hours advance warning, virtual elimination of no-shows, and careful monitoring of the collection procedure.

The validity of these assumptions can be better estimated when urinalysis results are compared with self-report data.

#### Self-Reported Drug Use

Potentially one of the best ways to obtain recent drug use history is to ask about it. The user may know what he thinks he has been using and he may be willing to tell you, if reasonable guarantees of anonymity or confidentiality are provided. However, there are several obvious problems:

1. The user may not know what he has been using, particularly when a blackmarket source is involved. He may know only a colloquial name that cannot be reliably collated with generic or brand names, or the product may be falsely represented.
2. He may know but be afraid to tell.
3. He may know but decide, for whatever reason, to lie or exaggerate.

Several researchers have studied the validity of drug-use questionnaires and interviews and the evaluation of several alternative methods for obtaining self-report data within the Army. Robins<sup>9</sup> found that 97% of a sample of servicemen who had been identified as positive at DEROS (Date Expected Return from Overseas), just prior to departure from Vietnam, admitted using narcotics in Vietnam to an interviewer who was ignorant of the subject's drug history. This suggests at least some degree of validity for the interview technique but is not conclusive; the fact that one confesses to prior deviant behavior which has already been discovered does not mean that he will confess to current deviant behavior which has gone undiscovered. While the same study found that admitted current use was higher than detected by urinalysis at the time of the interview, the finding is less a validation of the interview method than it is an indication of the limitations of non-random urinalysis. Another comparison of urinalysis and self-report data by anonymous questionnaires indicated that in matched groups the reported use in periods immediately preceding random urinalysis was approximately three times greater than the chemically positive laboratory reports.<sup>10</sup> Assuming that few respondents exaggerated their use, self-report

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<sup>9</sup> Robins, L. N. A follow-up of Vietnam drug users. Special Action Office for Drug Abuse Prevention, contract No. HSM-42-72-75. Special Action Office monograph, Series A, No. 1, April 1973.

<sup>10</sup> Research and Survey Section, Drug and Alcohol Abuse Control Program. Drug Abuse and Morale Monitoring Survey (DAMMS) Report No. 3. Fort Riley, KS. March 1972.

data appear more sensitive to drug use than the laboratory tests. This may be, in part, because the 3-day detectability period assumed in the study (corresponding to maximal detection intervals listed in TB MED 290) is optimistic. Of course, one is still in no position to estimate the absolute validity of questionnaire self-reports.

The most comprehensive attempt to resolve the doubts associated with drug questionnaire surveys and to provide guidance for the collection of future self-report data was undertaken by Brown and Harding.<sup>11</sup> Their studies compared: 1) Questionnaire vs. indirect inquiry methods, 2) Questionnaire vs. personal interview, and 3) Distribution of questionnaires by persons with varying images (e.g., mod civilian, Army doctor).

The questionnaire employed by Brown and Harding contained 62 items, of which almost half dealt with the respondent's past and present involvement with illicit drugs. Other questions concerned military status and experience, demographic characteristics, estimates of drug use in the respondent's unit, and his opinions concerning Army drug policy.

The principal indirect method employed was based upon a randomized inquiry (RI) technique originated by Warner<sup>12</sup> for estimating the proportion of a sample possessing a sensitive attribute without knowing whether any one individual has the attribute. Subjects were given decks of 50 cards, each card containing one sensitive and one non-sensitive question. For example,  $P_1\%$  of the cards asked the question, "Have you used marijuana or hashish during the past month?"  $P_2\%$  ( $100 - P_1\%$ ) of the cards asked the question, "Have you eaten a cheeseburger during the past month?" Subjects were allowed to look at the cards and to see that they contained these two questions. They were then asked to draw a card randomly and to answer yes or no. Then, they were instructed to repeat the procedure using a second deck of cards containing the same items but in different proportions. Given the proportions of both types of questions in each deck and the proportion of respondents answering yes or no from each deck yields two equations in two unknowns, so it is possible to solve for the proportion of yes responses to the sensitive question separately from that of the non-sensitive question.

Brown and Harding collected data from 1100 subjects, including 715 enlisted men (EM), in grades E1-E5, in four major Army installations. With respect to EM, the results suggest that both the questionnaire and the

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<sup>11</sup> Brown, G. H., and Harding, F. D. A comparison of methods of studying illicit drug usage. Human Resources Research Organization, Technical Report 73-9, April 1973. (AD 760 407)

<sup>12</sup> Warner, S. L. Randomized response: A survey technique for estimating evasive answer bias. American Statistical Association Journal, 1965, 60, 63-69.

technique provide the same estimates of drug abuse. It is not clear whether the similarity between methods results from the EM's truthfulness on questionnaires or whether he presents the same deceptions to similar questions using the RI technique because he fails to understand its built-in safety. The fact that a small junior officer sample appeared to report higher rates on drug use questions within the RI technique than on questions presented in the questionnaire does not entirely clarify the situation, since the difference may have occurred because the officers understood the RI safety factor better than the EM, or because the officers were more concerned that questionnaire responses might damage their careers. However, the discrepancy between methods revealed by the officer data paradoxically improves the validity of the questionnaire for EM; when some of a population is holding back substantially on the questionnaire for fear of identification, the RI comparison will show discrepancies if a sizable part of the population understand the extra safety feature. Since there was no such discrepancy in the EM data except for one drug category, this implies that relatively few of the EM were holding back on the anonymous questionnaire. Of course, other sources of error remain: the uncertainty of what drug has really been taken, the possibility of exaggeration, and the vagaries of human memory.

A second study by Brown<sup>13</sup> compared admissions of illicit drug use in anonymous questionnaires and personal interviews. Interviewers were young veterans with long hair, knowledgeable about the drug culture. The data suggested that the two methods yield essentially the same results. A third study<sup>14</sup> considered the possible impact of a test administrator's image on the validity of anonymous questionnaires. Tests given by one of five administrators who varied in appearance--young mod, conventional civilian, Army doctor, Army officer, and enlisted specialists (SP4 or SP5)--showed no significant difference in the drug abuse rates obtained under these various conditions.

Collectively, these studies suggest that the anonymous questionnaire may be as good as any other available instrument, including urinalysis, for estimating prevalence of illicit drug use in the young enlisted population. Further research is needed to estimate the bias introduced by exaggeration and uncertainties of drug identity and recall. Self-report methods have the general advantage of being apparently less sensitive than other sources to systematic variations in enforcement

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<sup>13</sup> Brown, G. H. Methodological problems in determining the true incidence of drug abuse. Paper presented at Military Operations Research Symposium, Washington, DC, December 1972.

<sup>14</sup> Brown, G. H. Drug usage rates as related to method of data acquisition. Human Resources Research Organization, Technical Report 74-20, August 1974.

practices, urinalysis administration, etc. Whatever bias they contain may be relatively constant across posts, commands, and minor variations in the data collection instrumentality.

## METHOD

### The Drug Use Questionnaire

Design. Based upon the review of methods described above, the decision was made that self-reports of drug use would be the most reliable criterion for the selection of high and low drug abuse units for study. Because a large number of units (510) had to be surveyed in a short time span, a questionnaire rather than an interview method was selected.

Several important considerations went into the design of the drug use questionnaire. The drug response categories had to be compatible with the drug categories used in the Army's random urinalysis program so that one could compare self-reports of drug use with urinalysis results. The questionnaire also had to be easy to administer in the field by untrained personnel while guaranteeing the respondent's anonymity. Finally, the questionnaire had to be brief and unambiguous.

A sample of the drug use questionnaire is shown as Figure 2. Note that each respondent was asked to describe his use of non-prescription drugs in each of nine categories over the preceding 30 days. The questionnaire was prepared in two forms, A and B, and these forms were mixed randomly for administration to each unit. The two forms differed only in the direction of the drug use frequency headings. Two forms were used to increase the respondent's perception of anonymity during administration. Prior to administration of the questionnaire, respondents were told that two different forms were being distributed and that they would probably not have the same form as the person sitting next to them.

Pretest. The drug use questionnaire was pretested with 137 soldiers under two conditions of administration. In one condition the questionnaire was administered by a representative from a civilian contractor and in the other condition it was administered by an E5 or an E6 in uniform. No significant differences in responses were found in any drug category between the civilian and military questionnaire administrations. It was concluded that the questionnaire could be administered by either civilian or military personnel without bias as long as anonymity were guaranteed.

## DRUG USE QUESTIONNAIRE

### BACKGROUND

HRB-Singer, Inc., under contract to the Department of the Army, is conducting a large-scale program of drug research. One of the objectives of the program is to obtain a clear picture of the extent of drug use in the Army. This questionnaire, which is being administered at numerous Army installations in CONUS, Europe and the Far East, is designed to obtain this information.

This research program is not associated with any law enforcement activity or any drug detection program, e.g., the urinalysis program. Furthermore, both the Department of Army and the Justice Department have guaranteed that none of the collected information will have to be turned over to them. Therefore, none of the information which you provide can be used against you. Please give complete and honest answers to all of the questions. **DO NOT WRITE YOUR NAME ON THIS QUESTIONNAIRE!**

### INSTRUCTIONS

Please check the box which specifies your rank: E1-E5  E6-E9

Place a check (✓) in the box which best describes the total number of days you have used that drug in the last month without a doctor's prescription. For example, if you used alcohol on eight days during the last 30 days, then you would check the column marked "used 7-14 days in last month." We are not interested in the number of times you used a drug on any one day, only in the number of days in the last month you used that drug.

(C-1) A (C-2)	Used Every Day in Last Month	Used 15-30 Days in Last Month	Used 7-14 Days in Last Month	Used 3-6 Days in Last Month	Used 1 or 2 Days in Last Month	Did Not Use in Last Month
	a	b	c	d	e	f
(C-7) Alcohol						
(C-8) Cannabis Drugs (marijuana, hashish, THC, etc.)						
(C-9) Hallucinogens (LSD, mescaline, peyote, STP, etc.)						
(C-10) Amphetamines (Benzadrine, Methadrine, Ritalin, "speed")						
(C-11) Barbiturates (Seconal, Nembutal, Amytal, "reds," "yellows")						
(C-12) Other Sedatives (Doriden, Mandrax, Sernyl, etc.)						
(C-13) Cocaine (coke)						
(C-14) Methadone						
(C-15) Other Opiates (heroin, morphine, opium, Demerol, codeine, etc.)						

Figure 2. Reproduction of the drug use questionnaire

## Sample

Sample Characteristics. Drug use data were collected from Army TO&E company-size units in the United States, Germany, and Korea. A random sample of 30 units was drawn from each of six divisions in Germany, and from each of six posts in the U.S. A random sample of 150 units was drawn from all of Korea. Table 1 indicates the size of the use-questionnaire sample by theater of operation.

Table 1  
USE QUESTIONNAIRE SAMPLE

Theater	Number of Units Originally Sampled	Number of Units Returning Questionnaire	Total Usable N
U.S.	180	167	7,416
Korea	150	108	5,065
Germany	180	123 <sup>a</sup>	4,660
Totals	510	398	17,141

<sup>a</sup> Data from 36 units in Germany were received too late to be scored and used.

In each unit the use questionnaire was administered to every E1 to E5 available for duty that day. The total sample size based on usable returns was 17,141 enlisted men in grades E1 to E5 from 398 TO&E units.

Questionnaire Administration. Administration of the use questionnaire was different in each theater. In the U.S. the questionnaire was administered by personnel from the Alcohol and Drug Control Office (ADCO) at each post, using a "ballot box" arrangement. The ADCO staff person would visit a unit, explain the purpose of the research, distribute the questionnaires, and collect them in a sealed box with a slit in the top. He would then return to his office, remove the questionnaires from the ballot box, and package them for shipment to a private research firm.

In Germany, the research team met with representatives from each of the units being tested and trained them in the administration of the questionnaire. Each representative returned to his unit and distributed a questionnaire and an envelope to every E1 to E5. When the respondent completed the questionnaire he was to seal it in the envelope and return it to the unit representative who in turn forwarded all of the sealed envelopes to the Division ADCO. The Division ADCO shipped all the sealed questionnaires from his division to the private research firm.

The administration procedure in Korea was similar to the procedure used in Germany, except that questionnaires were mailed directly to each unit, and each unit returned the sealed envelopes by mail to the U.S. Army Research Unit in Korea. The U.S. Army Research Unit logged the unit and mailed the questionnaires to the firm.

The use questionnaires were administered in the U.S. from the first of March 1973 through mid-April. In Korea, administration occurred during the months of April and May. Units in Germany were administered the questionnaire during the month of June.

Return Rates. Extreme conservatism was used in scoring the use questionnaire. This conservatism was dictated in part by the need to compare the questionnaire results with urinalysis results. Returned use questionnaires were placed in one of five categories:

Category 1 - This category represented totally blank returns--a questionnaire with none of the drug categories checked.

Category 2 - This category included questionnaires in which the respondent checked the "Used Every Day in Last Month" column for every drug (excluding alcohol and cannabis). These exaggerated returns were not used.

Category 3 - Respondents included in this category failed to place a check in one or more of the drug categories, with the exception of alcohol, but still checked some of the categories. These incomplete returns were not used.

Category 4 - In this category were included respondents who placed a check under two frequency headings in one or more of the drug categories. These contradictory returns were not used.

Category 5 - This category included usable returns which were all returns minus those placed in categories 1 through 4.

Table 2 indicates the percentage of use-questionnaire returns in each of the five categories, by theater. Note that the rate of blank returns received from Germany is double that of the U.S. or Korea, as also is the rate of returns marked "everyday for every drug" (Category 2). Interviews with enlisted men during another phase of this research suggested several possible reasons for these differences. One was fear. Apparently the heavy anti-drug campaign under way at the time in Germany made the enlisted men extremely distrustful; many reported that they believed that these questionnaires were really for command rather than research purposes. Another reason given was apathy. Many of the soldiers in

Germany said they simply did not care enough to fill out the questionnaire. They perceived the military as being unresponsive to their needs; filling out a questionnaire seemed a futile exercise. Finally, many soldiers were evidently releasing their hostile feelings about the Army by purposefully exaggerating their drug use experiences (Category 2). A Drug Abuse Prevalence (DAP) index was constructed from the usable returns.

Table 2

PERCENTAGE OF USE QUESTIONNAIRE RETURNS  
BY RESPONSE-CATEGORY PLACEMENT

Response Category	United States	Theater Germany	Korea
Category 1 (Blanks)	7%	18%	8%
Category 2 (Every drug, every day)	2%	4%	2%
Category 3 (Missing data)	11%	14%	15%
Category 4 (Double responses)	1%	2%	1%
Category 5 (Usable returns N = 17,141)	79%	62%	74%
Totals returned	100%	100%	100%

Reliability of the Drug-Use Questionnaire

There are several classic ways of measuring a questionnaire's reliability. Unfortunately, none was particularly appropriate for the drug-use questionnaire.

A conservative, usually preferred method of estimating reliability is with alternate forms. In this method, two forms of the instrument are developed, each containing different items but tapping the same content and administered under the same conditions. Scores from the two forms are correlated to obtain an estimate of reliability. However, there is no feasible way to change items in the drug-use questionnaire without fundamentally altering the content.

A second major method of estimating reliability is through a measure of internal consistency (e.g., split-half or odd-even). Since this brief questionnaire taps a different content (drug) with each item, one cannot use the measure of internal consistency.

The test-retest method was considered to be the best method for assessing reliability in this case. This method is usually not the favored reliability assessment technique because one cannot know if one is assessing the reliability of the instrument or the stability of the behavior or trait being measured. It is safe to assume that in this case a substantial portion of the error can be attributed to the instability of drug-use rates in the units over the period of the study. That time period was about one month for the U.S. and German units, and about four months for the Korea units.

Korea presented a very different test-retest situation than did the U.S. and Germany because of the greater time between questionnaire administrations. Since Korea is a 13-month tour of duty, the expected turnover in personnel in the 4-month period would be 30%, which would not tend to stabilize the DAP ratings. Also, the selection ratio (number of high and low-use units selected over the total number of units sampled) was less favorable for Korea than it was for the U.S. and Germany. For these reasons the use questionnaire was readministered to all units in Korea, and the reliabilities were computed separately for Korea and for a combination of the U.S. and Germany.

There were a total of 10 retest units in Germany and the U.S. The Pearson product moment correlation computed on DAP values for the test and retest conditions in the U.S. and Germany combined was .81. For 22 units in Korea the correlation coefficient was .44. Thus, reported drug use was relatively stable in the U.S. and Germany, and only moderately stable in Korea over a much longer time span.

Actually, the correlation coefficient of .81 for U.S.-Germany stability would in itself indicate an acceptable reliability if one could assume that no change in drug-use rates occurred during the test-retest interval (in which case the correlation would be a more accurate estimate of reliability). Consequently, it was concluded that the drug-use questionnaire used in this study was of sufficient reliability.

## RESULTS

### Drug Use Rates

Table 3 shows the percentage of respondents admitting to drug use for each type of drug according to their frequency of use. Because these data were collected from TO&E units in specific locations, they are not intended as population estimates; nevertheless, the sample is sufficiently representative to yield valuable information on the drug use of young enlisted men in Korea, Germany, and the United States. It is clear from these data that the legal drug, alcohol, is still the most frequently used by these young enlisted men. Cannabis (marijuana or hashish) is the most widely used illicit drug, and it is used by as many men on a daily basis as alcohol. All other drugs are used on a relatively infrequent basis. Indeed, the large majority of users of illicit drugs appear to be

Table 3  
 PERCENTAGE OF RESPONDENTS (E1-E5, TO&E UNITS) ADMITTING TO DRUG USE  
 (N = 17,141)

	Used Every Day in Last Month	Used 15-30 Days in Last Month	Used 7-14 Days in Last Month	Used 3-6 Days in Last Month	Used 1-2 Days in Last Month	Did Not Use In Last Month
Alcohol*	10.6	16.5	18.2	17.6	15.5	21.6
Cannabis	11.3	9.8	6.4	5.6	7.1	59.8
Hallucinogens	0.5	1.3	1.7	3.4	6.4	86.7
Amphetamines	0.7	1.7	2.5	4.0	6.0	85.1
Barbiturates	0.6	1.3	1.7	2.6	4.1	89.6
Other Sedatives	0.6	0.8	1.2	1.5	3.0	92.9
Cocaine	0.8	0.9	0.8	1.7	3.5	92.3
Methadone	0.4	0.6	0.4	0.5	1.2	96.8
Opiates	0.9	1.1	1.1	1.7	3.4	91.8

\* Percentages for alcohol are adjusted for 513 no responses (N = 16,628).

Note. Data from Hurst, P. M., Walizer, D. G., Ridona, W., and McKendry, J. Assessment of drug abuse prevalence. HRB-Singer Report No. 4664-1, 1973.

using them only occasionally. This fact is graphically depicted in Figure 3. It is particularly significant that even the users of the harder drugs (especially the opiates) are for the most part occasional users ("chippers") and not addicted or habituated to these drugs.

In addition to indicating general prevalence and use patterns, the drug-use questionnaire made possible the comparison of use among three locations: The U.S., Korea, and Germany. Use rates for Korea and Germany were compared with the U.S. use rate for each drug category (Table 4), and significance was judged by chi-square analysis. The phi coefficient was calculated for each significant chi-square to give an indication of the strength of the relationship that was found. (The large sample size could be expected to yield significant chi-squares even when very small differences in percentages existed.)

Although 13 of 18 chi-squares indicated in Table 4 were significant, only three of the relationships were considered to be of practical significance; two of these indicated a lower use rate of hallucinogens in Korea and Germany than in the U.S., and one indicated a higher use rate of other sedatives (probably Mandrax) in Germany. A less substantial finding was the lower use rate for cocaine in Korea and Germany.

#### Comparison of Urinalysis with Self-Report Data

Initially, the chemical urinalysis data was expected to be the most promising measure among the objective (not self-report) indicators of drug use. However, there were insufficient identifications per unit to use urinalysis as an index of drug use. The question then arose as to the relationship between self-report data and the urinalysis. In making the comparisons, the use-questionnaire data were treated as the predictor and the chemical positive incidences as variables to be predicted. In order to predict chemical positives from the self-report data, it was necessary to achieve comparability of data bases. This required the following restrictions:

1. Each drug category commonly reported among "chemical positives" (O/opiates, A/amphetamines, B/barbiturates, and M/methadone) was represented only once on the use questionnaire.
2. Urinalysis findings to be entered into the analyses were restricted to data from the types of units (roughly, those with TO&E structure) sampled by the use questionnaire.

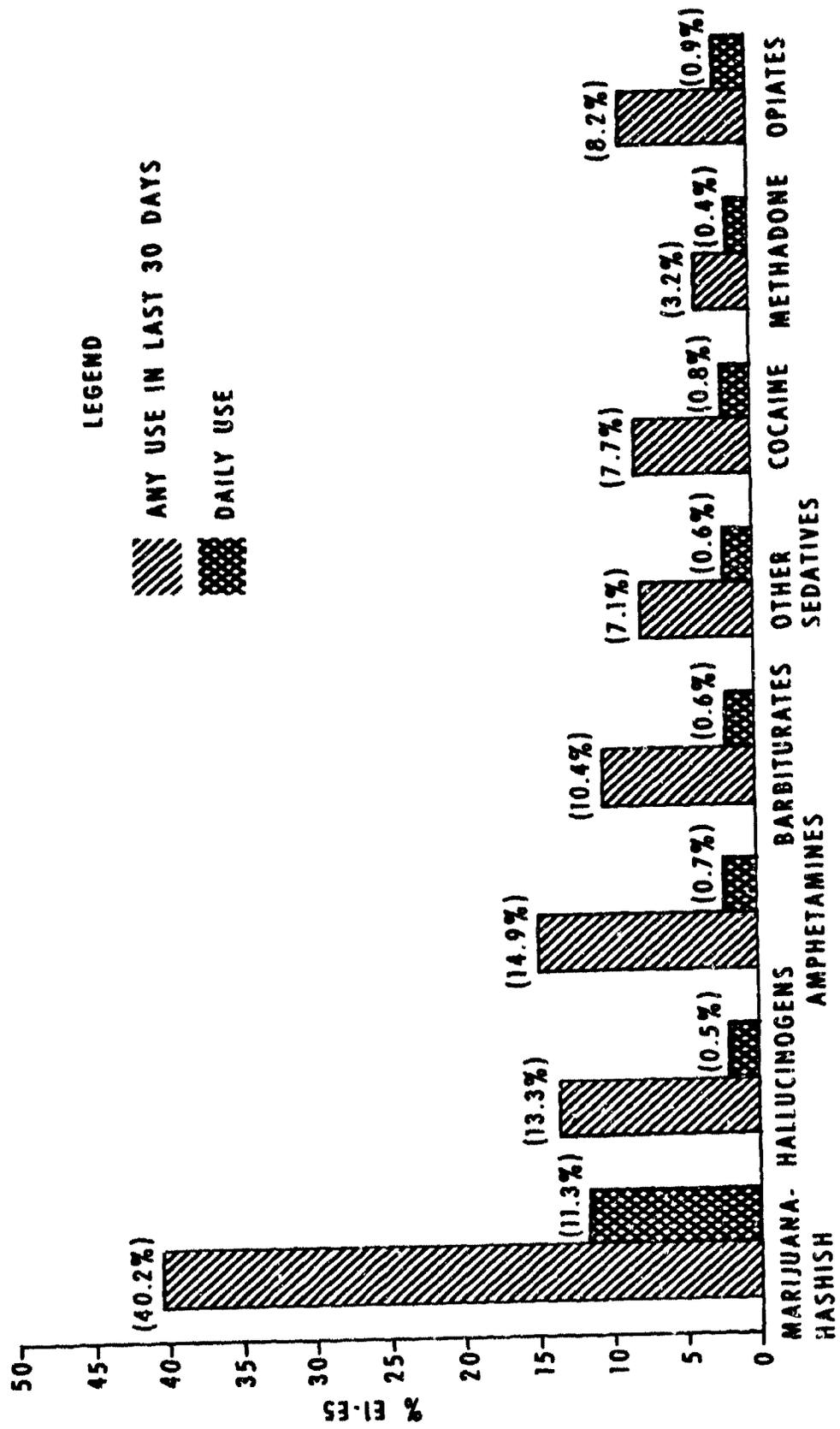


Figure 3. Drug use rate for E1-E5 in TO&E units (N = 17,141).

Table 4

## PERCENTAGES OF SELF-REPORTED DRUG USE COMPARED BY LOCATION

Drug Category	United States (N = 7,416)	Korea (N = 5,065)	Germany (N = 4,660)
Alcohol	80	84	82
$\chi^2$		30.77*	7.42
$\phi$		.050	.025
Cannabis	41	40	39
$\chi^2$		1.16	3.35
Hallucinogens	17	9	12
$\chi^2$		149.69*	56.43*
$\phi$		.110	.069
Amphetamines	15	12	18
$\chi^2$		26.28*	18.26*
$\phi$		.046	.039
Barbiturates	11	12	8
$\chi^2$		3.50	24.84*
$\phi$			.045
Other Sedatives	5	3	15
$\chi^2$		23.71*	360.63*
$\phi$		.044	.173
Cocaine	10	6	6
$\chi^2$		48.45*	43.28*
$\phi$		.062	.060
Methadone	4	2	3
$\chi^2$		26.42*	11.66*
$\phi$		.046	.031
Opiates	8	7	10
$\chi^2$		0.58	31.23*
$\phi$			.051

Note. Chi-square analyses comparisons are with U.S. figures.

\*  $p < .001$

3. The use questionnaire was restricted to E1-E5 grades. That this very nearly coincides with the population subject to random urinalysis is clear from urinalysis reports, even though DOD directives specify an age criterion (under 29 years) rather than pay grade. This is also the population that Brown and Harding<sup>15</sup> found to give "valid" responses to anonymous drug-use questionnaires, as far as the reported use prevalence agreed with that calculated by randomized inquiry.

4. Urinalysis data, taken from installations or commands given the use questionnaire, were aggregated for those months symmetrically bracketing the date on which the questionnaire was administered. Here, the increased reliability for inclusion of urinalysis data (from a longer time span in months) had to be weighed against the possibility of bias due to any non-linear shift in drug use frequency. Two alternative data bases were used from most commands or installations: (a) the two-month period most relevant to the use questionnaire--if given in March, self-reported "last month" usage refers to February and March--and (b) a longer period, depending on data availability, that symmetrically bracketed the time period of relevance to the use questionnaire.

There was, however, a conservative bias in the use questionnaire such that (other things being equal) it would tend to under-predict urine positives. Being originally designed to detect high and low drug abuse units, it included instructions to report only non-prescribed drug use. Another source of conservative bias is in the calculation of proportions of time "vulnerable" to urinalysis detection. If a respondent reported use on "n" days last month, it was assumed (for prediction of vulnerability) that this use occupied a single unbroken time span. To the extent that urinalysis will detect drugs for time periods following the day of actual last ingestion, this assumption was conservative. In theory, a respondent could use a drug ten times per month at 3-day intervals and be vulnerable all month. By this method, however, it was assumed that he was vulnerable only 10/30 to 13/30 of the time.

The difference between 10/30 and 13/30 is due to different alternative assumptions about vulnerability, which depends both on dosage and laboratory efficiency. Alternative time constants of 0, 1, 2, and 3 days following day of last ingestion were introduced into the calculations.

Due to its multiple-choice format, the drug use questionnaire did not specify the exact number of days per month a drug was used, except

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<sup>15</sup> Brown and Harding, 1972, op. cit.

for the "daily" and "none" categories. The other categories were 15-30 days, 7-14 days, 3-6 days, and 1-2 days. When such a category was checked, the mid-point was chosen as the estimate of days of use during the month specified.

Results of the Comparison. Tables 5 to 8 compare laboratory-reported drug positive percentages with those predicted from use questionnaire data for three U.S. installations and one separate Army division in Germany. Laboratory reports are aggregated for the immediate time frame referred to in the use questionnaire and, for the U.S. the eight-month period bracketing this time frame. For the separate division the appropriate time frame was April-May 1973, but data were available only from January-March and May-June. Since the numbers of tests were rather low, all these months were aggregated for a "best estimate" even though the period represented was somewhat asymmetrical about the most relevant time interval.

Use questionnaire data were inserted into the comparison model. In mathematical form this is:

$$P = 100p$$

$$p = (I + kW)/N$$

$$I = X_a + 0.75 X_b + 0.35 X_c + 0.15 X_d + 0.05 X_e$$

$$W = X_b + X_c + X_d + X_e$$

where:

P = Predicted percentage of urine samples laboratory positive from illicit use of a given drug category

p = Predicted proportion of urine samples laboratory positive from illicit use of a given drug category

I = Expected number in group who will be using a given drug on any randomly selected day

W = Expected number in group using given drug on a given day excluding daily users

k = Weighting constant to predict vulnerability as a function of days elapsed since last ingestion (not applicable to daily users)

X<sub>a</sub> = Number of self-reported daily users

X<sub>b</sub> = Number of self-reported 15-30 times/month users

X<sub>c</sub> = Number of self-reported 7-14 times/month users

X<sub>d</sub> = Number of self-reported 3-6 times/month users

X<sub>e</sub> = Number of self-reported 1-2 times/month users

N = Total number of respondents in group

Table 5  
COMPARISON OF PERCENT LABORATORY POSITIVES AND PERCENT  
USE-QUESTIONNAIRE PREDICTED POSITIVES AT FORT A

	Drug Category				
	Opiates	Amphet- amines	Barbi- turates	Methadone	
Lab Reports February-March 1973: No. of tests = 2,458	1.05%	2.27%	0.97%	0.08%	
Lab Reports November '72-June '73: No. of tests = 7,615	0.97	1.74	1.66	0.09	
Predicted Percent Positive from Use Questionnaires March 1973					
1,497 Respondents	k=0	2.26	5.06	3.24	1.21
	k=1/30	2.90	5.68	3.62	1.36
	k=2/30	3.18	6.30	4.00	1.50
	k=3/30	3.46	6.92	4.39	1.64

Table 6  
COMPARISON OF PERCENT LABORATORY POSITIVES AND PERCENT  
USE-QUESTIONNAIRE PREDICTED POSITIVES AT FORT B

	Drug Category				
	Opiates	Amphet- amines	Barbi- turates	Methadone	
Lab Reports February-March 1973: No. of tests = 4,705	0.34%	0.21%	0.27%	0.00%	
Lab Reports November '72-June '73: No. of tests = 15,414	0.40	0.33	0.39	0.00	
Predicted Percent Positive from Use Questionnaires March 1973					
1,589 Respondents	k=0	1.91	2.97	2.60	1.38
	k=1/30	2.07	3.32	2.85	1.47
	k=2/30	2.23	3.68	3.09	1.57
	k=3/30	2.39	4.04	3.34	1.67

Table 7

COMPARISON OF PERCENT LABORATORY POSITIVES AND PERCENT  
USE-QUESTIONNAIRE PREDICTED POSITIVES AT FORT C

	Drug Category				
	Opiates	Amphet- amines	Barbi- turates	Methadone	
Lab Reports February-March 1973: No. of tests = 2,272	0.22%	0.48%	2.72%	0.35%	
Lab Reports November '72-June '73: No. of tests = 6,924	0.33	0.41	2.20	0.36	
Predicted Percent Positive from Use Questionnaire March 1973					
1,002 Respondents	k=0	2.45	4.78	3.30	1.01
	k=1/30	2.72	5.38	3.76	1.15
	k=2/30	3.00	6.01	4.22	1.29
	k=3/30	3.27	6.62	4.68	1.44

Table 8

COMPARISON OF PERCENT LABORATORY POSITIVES AND PERCENT USE-QUESTIONNAIRE  
PREDICTED POSITIVES FROM DIVISION X, GERMANY

	Drug Category				
	Opiates	Amphet- amines	Barbi- turates	Methadone	
Lab Reports January-June 1973: No. of tests = 1,588	1.19%	1.13%	0.00%	0.00%	
Predicted Percent Positive from Use Questionnaire May 1973					
760 Respondents	k=0	3.82	5.53	2.46	0.96
	k=1/30	4.21	6.15	2.81	1.03
	k=2/30	4.54	6.81	2.99	1.11
	k=3/30	4.85	7.44	3.23	1.19

Results from this model are listed with alternative assumptions about detectability. For example,  $k = 3/30$  is the chance of detection in a given month in addition to the chance of detection on the days actually used. Thus, this constant is added to the monthly incidence of drug use for all categories of use frequency except daily users. The total extended vulnerability from such categories in terms of man-days per month is equal to  $kW$ .

It does not seem to matter a great deal whether one assumes a detectability of "up to 3 days" or only on day of ingestion ( $k = 0$ ); reported lab positives are generally much fewer than statistically predicted from self-reported use. Even with  $k = 0$ , the ratio of lab-reported to predicted values ranged from zero to 0.67, with a median of 0.18. This is particularly significant considering the conservative assumptions of the predictive model:  $k = 0$ , and only illicit use reports being considered. If self-reported illicit use were used to predict the incidence of confirmed drug abuse rather than of lab positives, the discrepancies would have been even greater.

#### DISCUSSION

The comparison of urinalysis results with self-report data revealed a sizeable discrepancy between the two methods. Although both methods carry some amount of error, it is probable that either the self reports are inflated estimates or that urinalysis produces underestimates.

In order for the urinalysis data to be considered valid indicators, one must account for the apparent exaggerations in self-report data and the variations in urinalysis data from post to post. For example, the ratio of lab-reported use of opiates to that predicted from self reports varies from 0.13 to 0.37 across installations, as indicated in Table 9. To the extent that urinalysis data are accurate predictors, use-questionnaire respondents must have exaggerated their opiate abuse by a factor of 2.7 at Fort A and 7.7 at Fort C, i.e., about three times as many exaggerating respondents at Fort C as at Fort A. A similar rate of exaggeration (3.7) would have had to occur with regard to amphetamines. The exaggeration factor for barbiturates is about 2 at Fort A but only about 1.5 at Fort C. For methadone, the factor is 14 at Fort A but less than 3 at Fort C. Such differential rates of exaggeration across drugs seem unlikely. While there were 153 barbiturate lab positives at Fort C, there were no barbiturate positives from Division X. In contrast to this urinalysis variation, the self-reported barbiturate use was only 1.3 times as great at Fort C as in Division X. In short, it seems highly unlikely that if exaggeration processes were operating, the patterns of exaggeration could vary so grossly among installations.

On the other hand, if the self-report data are to be considered valid prevalence estimates, one must account for the apparent underestimates of the urinalysis data. The potential sources of the error most probably lie in faulty administration of the urinalysis (i.e., improper collection of specimens) and/or in the vagaries of biochemical processes. Some of the procedural loopholes of urinalysis--no-shows, excessive warning times,

Table 9

SUMMARY: PERCENT LABORATORY POSITIVES VS PERCENT  
PREDICTED POSITIVES FROM USE QUESTIONNAIRE  
WITH k=0, BY INSTALLATION OR DIVISION

	Fort A	Fort B	Fort C	Div. X
	11/72-6/73 <sup>a</sup> N = 7,615 <sup>b</sup>	11/72-6/73 <sup>a</sup> N = 15,414	11/72-6/73 <sup>a</sup> N = 6,924	1/73-6/73 <sup>a</sup> N = 1,586
Opiates, Lab Report	0.97%	0.40%	0.33%	1.19%
Opiates Predicted, k=0	2.62%	1.91%	2.45%	3.82%
Ratio, Reported/Predicted	0.37	0.21	0.13	0.31
Amphetamines, Lab Report	1.74%	0.33%	0.41%	1.13%
Amphetamines Predicted, k=0	5.06%	2.97%	4.78%	5.53%
Ratio, Reported/Predicted	0.34	0.11	0.09	0.20
Barbiturates, Lab Report	1.66%	0.39%	2.20%	0.00%
Barbiturates Predicted, k=0	3.24%	2.60%	3.30%	2.46%
Ratio, Reported/Predicted	0.51	0.15	0.67	0.00
Methadone, Lab Report	0.09%	0.00%	0.36%	0.00%
Methadone Predicted, k=0	1.21%	1.38%	1.01%	0.96%
Ratio, Reported/Predicted	0.07	0.00	0.36	0.00

<sup>a</sup> Urinalysis reporting period.

<sup>b</sup> N = Number of lab tests.

insecure collection procedures, etc.--were described above. The most thorough examination of procedural problems in urinalysis was performed by Reaser, Richards, and Hartsock<sup>16</sup>, who employed a research design which randomly allotted soldiers either to a urinalysis condition or a questionnaire condition. In addition, a research team interviewed staff and observed the urinalysis procedures. The comparison data showed a discrepancy in rates very similar to the present study, the surveys yielding rates about 10 times those of urinalysis. In addition, gross variations were observed in urinalysis procedures from post to post, and a number of loopholes were documented. Reaser and his colleagues concluded that the "survey rate is a better estimate of the incidence of abuse than the urinalysis rates in that the field-implemented random screening procedures provide ample opportunity for the potentially identifiable user to successfully avoid detection." Furthermore, detection effectiveness can vary with the drug. Detection is usually better for opiates than amphetamines, and least effective for methadone.

Finally, it should be recognized that prevalence estimates should, ideally, indicate which drugs are being used at what particular frequency; i.e., what the patterns of illicit drug use are, not simply how many soldiers have recently ingested a particular drug. The drug-usage data suggest that the use of illicit drugs is a behavioral, social problem of complex proportions. The data indicate that the great majority of individuals who are using illicit drugs are doing so on a fairly infrequent basis--"chipping"--and do not appear to be dependent. Furthermore, other data<sup>17</sup> reveal that individuals are highly variable in their patterns of drug use; over a period of months and years, individuals will greatly vary their level of use, often switching drugs and interrupting their use as circumstances dictate. Consequently, apart from the problem of sampling procedure and the vagaries of biochemistry, urinalysis is not an appropriate technique for assessing drug use prevalence in the sense mentioned above. By its very nature, it places the occasional user in the same category as the addict.

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<sup>16</sup> Reaser, J., Richards, J., and Hartsock, S. The incidence of drug abuse in the Army: A comparison of urinalysis and survey rates. Human Resources Research Organization, draft report, November 1973.

<sup>17</sup> Ramsay, D. A., Cook, R. F., and Hostetter, R. S. Polydrug use patterns of U.S. Army personnel. ARI Technical Paper (in preparation).

## CONCLUSIONS

The evidence from this and related research strongly suggests that estimates of drug abuse prevalence derived from the results of random urinalysis are underestimates of the actual prevalence of illicit drug use in the Army. It should be recognized, however, that these results say nothing about the effectiveness of urinalysis as a deterrent to illicit use or as a device for detecting drug use. The use of a brief, anonymous, confidential self-report form provides rates which are most probably nearer the actual rates of illicit use, mainly because the self-report has less potential for error and because it permits drug use patterns to be estimated over a longer period.

Note. Urinalysis was halted in the services in mid-1974, after this study was completed. Plans have been announced by the Department of Defense for the resumption of urinalysis in early 1975, using the radio-immunoassay (RIA) technique exclusively for initial screening. The RIA method is reported to be capable of screening for opiates, barbiturates, amphetamines, and methaqualone (Sopers, Mandrax) and is more sensitive than TLC and FRAT.<sup>18</sup> Two consequences are expected to result from using RIA: (1) there will be greater uniformity in quality control among different testing laboratories, and (2) because of the increase in sensitivity, some individuals will be "at risk" for a longer period of time. However, the continued requirement for clinical confirmation, including GLC confirmation of chemical positives, and the mechanics of administering tests should not significantly alter the conclusions reached in this report. The primary problem of using urinalysis data to estimate prevalence is not due to faulty chemical tests but to the interaction between the entire testing program and the dynamics of drug use by soldiers.

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<sup>18</sup> Catlin, D. W. A guide for urine testing for drugs of abuse. Special Action Office for Drug Abuse Prevention, contract No. DA3AA426. Special Action Office monograph, Series B, No. 2, November 1973.

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