EXECUTIVE SUMMARY

INTRODUCTION

Transmission of the human immunodeficiency virus (HIV) can occur when drug users share an HIV-contaminated needle, syringe, or other equipment (such as the cooker and cotton ball) used to inject drugs. Injection drug users may also incur AIDS risk through sexual intercourse, which is thought to be the primary route through which HIV could spread further to heterosexual adults who do not inject drugs and to unborn children.

Noninjection drug use is also a source of AIDS risk. People who have sex while under the influence of alcohol or other drugs are more likely to engage in unsafe sex because of impaired judgment or lowered inhibitions. Unsafe sex is reportedly widespread among people who smoke crack cocaine.

In response to a request from the Los Angeles County AIDS Program Office, UCLA's Drug Abuse Research Group has collected and summarized all available information on HIV seroprevalence and AIDS risk among Los Angeles drug users. Findings and conclusions are summarized below.

SEROPREVALENCE

Most local studies to assess HIV seroprevalence among injection drug users have been conducted in methadone maintenance/detoxification clinics. Seroprevalence rates in those studies have ranged from 1% to 3%. Because the primary drug of abuse for methadone-treatment clients is opiates, these findings suggest that seroprevalence is probably no higher than 3% for injection opiate users who are enrolled in methadone maintenance/detoxification treatment (pages 6-8).

Some seroprevalence studies have recruited injection drug users in non-treatment settings, including sexually transmitted disease clinics and public places (such as parks and street corners) where drug users are known to congregate. HIV infection rates have ranged from 4% to 8% in these studies, suggesting that seroprevalence is probably no higher than 8% among injection drug users not in treatment (pages 9-11).

These findings should be considered tentative for two reasons. First, most studies were based on samples of volunteers, and refusal rates were often high. Thus volunteer self-selection could have biased the results in either direction. Second, confidence intervals around these seroprevalence rates are unknown. Neither limitation is necessarily critical. Self-selection bias may not be important because in blinded studies, which are not subject to self-selection, seroprevalence rates have been similar to rates found in other studies. In addition, the low variability in seroprevalence across studies suggests that confidence intervals may in fact be rather narrow (pages 5-6,8,11).

Recent trends suggest the possibility of a slight increase in seroprevalence among injection drug users in Los Angeles. However, this trend may be due to variability in the degree to which drug users at highest risk are motivated to seek antibody testing. The trend may also be due to random fluctuations in sampling. Only through continued monitoring can this possibility be confirmed or disconfirmed (pages 11-13).

AIDS-RELATED BEHAVIOR AND ATTITUDES

In several important respects, Los Angeles drug users appear to have reduced their risk of AIDS. Studies conducted from 1986 to 1990 indicate trends toward less frequent sharing of injection equipment and less frequent use of drugs at shooting galleries. Among drug users who still share injection equipment, bleach use has increased. So has the use of condoms among drug users with multiple sex partners. Over time, more injection drug users have come to accept the fact that bleach and condoms are effective in avoiding HIV infection (pages 19-30).

Favorable trends aside, many injection drug users continue to incur AIDS risk. Most still share injection equipment, and the previously cited trend toward less sharing appears to have leveled off. Further, about half of the drug users who still share injection equipment do not disinfect it with bleach, and almost half of those with multiple partners do not use condoms. There has been no decrease in the percentage of drug users who have sex under the influence of alcohol/drugs, and there is evidence of increasing risk from sex with multiple partners. Despite their self-reported risks, most injection drug users still believe that the risk of contracting AIDS is no higher for them than for other people (pages 19-30).

Cross-sectional research indicates that drug-related AIDS risk is not associated with drug-user background characteristics such as gender, age, race/ethnicity, or education. On the other hand, one source of sex-related AIDS risk--sex with multiple partners--is higher among drug users who are regularly high on alcohol or drugs during sex, those who work as prostitutes, and those who smoke crack cocaine. However, prostitutes and crack smokers do attempt to manage their AIDS risk to some degree. Compared to other drug users, prostitutes and crack smokers appear more likely to use condoms (pages 35-48).

Limited evidence indicates a high risk of AIDS among incarcerated and homeless youth, who report inconsistent condom use, frequent sex while under the influence of alcohol/drugs, and frequent acts of "survival sex" in exchange for money, food, or shelter. In addition, many homeless youth inject drugs or have sex with adult injection drug users (pages 31-32).

A comparison of AIDS-risk trends in Los Angeles and San Francisco suggests that injection-equipment sharing has followed a similar pattern of decline in both cities. However, increases in bleach use have been much more extensive in San Francisco than in Los Angeles. Outreach efforts in both cities have promulgated the same message on sharing but quite different messages on bleach use. In San Francisco but not in Los Angeles, bleach is widely distributed; and its use, aggressively promoted (pages 49-56).

CONCLUSION

Though HIV seroprevalence among injection drug users in Los Angeles is probably no higher than 8% at present, a future and rapid increase in seroprevalence is quite possible in Los Angeles. This conclusion is based on two summary observations. First, San Francisco infection rates doubled in the span of one year (1986-87) even though the risk of AIDS was widely recognized among drug users. Second, despite notable changes in behavior, many injection drug users in Los Angeles remain at high risk.

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SECTION 1: INTRODUCTION

DRUG USE AND THE RISK OF AIDS

From the outset of the AIDS epidemic, use of illicit drugs by injection has been strongly associated with the risk of AIDS. Heterosexual and gay/bisexual adults who inject illicit drugs comprise 28% of the adult AIDS cases reported thus far in the United States. Some east coast states continue to report a high annual incidence of AIDS cases among injection drug users, but the rate of increase in such cases is now faster in California than in the nation overall (California Department of Health Services, 1989a). Moreover, though gay/bisexual men still comprise the great majority of AIDS cases among non-Hispanic whites, AIDS has disproportionately affected injection drug users who are black or Hispanic. Injection drug use is a risk factor in 14% of the state's total AIDS cases, but the comparable statewide figures (as of September 1989) are 15% for Hispanics and 26% for blacks. Similarly, injection drug use is a risk factor in 11% of all AIDS cases in Los Angeles County. Through September 1990, 12% of injection drug users diagnosed with AIDS in Los Angeles have been Hispanics, 21% blacks, and 9% non-Hispanic whites (Los Angeles County AIDS Epidemiology Program, 1990a; see also Kane, 1990).

Transmission of the "AIDS virus," formally known as the human immunodeficiency virus (HIV), can occur when drug users share an HIV-contaminated needle, syringe, or other equipment (such as the cooker or cotton ball) used to inject drugs such as cocaine and heroin. Sexual intercourse adds further risk for injection drug users, especially if they do not use condoms (Hulley and Hearst, 1989). Sexual transmission is thought to be the primary route through which AIDS could make further inroads into the heterosexual population (Longshore, 1989; Miller et al., 1990) because injection drug users often have sex partners who are not injection drug users themselves (Cohen et al., 1989; Curtis et al., 1989; Rhodes et al., 1990a; Webb et al., 1990). Nationally, about two-thirds of all women who have contracted AIDS through sex were the partners of injection drug users (Guinan and Hardy, 1987). In turn, HIV transmission from mother to child is thought to occur primarily among women who, knowingly or not, have sex with men who inject drugs (Cochran, 1989; Steinbrook, 1989).

The relatively high level of AIDS risk from drug injection is underscored by the speed with which the virus can spread among injection drug users. Tests conducted on stored blood samples indicate that HIV seroprevalence among injection drug users living in Manhattan was 10% in 1978, 25% a year later, and 40% by 1980; seroprevalence has stabilized at 55-60% since 1984 (Des Jarlais et al., 1989). In Edinburgh, Scotland, HIV seroprevalence reached 50% within two years of the first detected seropositive case (Robertson et al., 1986). These explosive increases of HIV infection have occurred among drug users in many areas (Centers for Disease Control, 1990; Coutinho, 1990; Mann, 1990), and California is no exception. Even though the risk of AIDS was widely recognized by the mid 1980s, HIV seroprevalence among San Francisco injection drug users doubled between 1986 and 1987--roughly from 6% to 12%. Since then, it has apparently leveled off at about 15% (Watters, 1989).

Noninjection drug use is a further source of AIDS risk. People who have sex while under the influence of alcohol or other drugs are more likely to engage in unsafe sex because of impaired judgment or lowered inhibitions (Miller et al., 1990). Unsafe sex is reportedly widespread among people who smoke crack cocaine (Boyle, 1990; Fullilove et al., 1990; Goldsmith, 1988; Miller et al., 1990; Scribner et al., 1990; Weissman et al., 1990).

In response to a request from the Los Angeles County AIDS Program Office, UCLA's

Drug Abuse Research Group has collected and summarized all available information on HIV seroprevalence and AIDS risk among Los Angeles drug users.

CONTENTS OF THIS REPORT

Section 2 presents data now available on HIV seroprevalence among injection drug users in Los Angeles County. (Reliable seroprevalence data do not exist for noninjection drug users.) We assembled data from studies conducted in drug abuse treatment programs and studies reaching injection drug users currently not in treatment. Locations for the non-treatment studies include, for example, sexually transmitted disease clinics, jails, homeless shelters, and public places (such as parks and street corners) where drug users are known to congregate.

Section 3 reviews findings available from surveys measuring the frequency of AIDS-risk behaviors and attitudes among Los Angeles drug users. Most surveys have focused on injection drug users, but limited findings exist for noninjection drug users as well. Behaviors covered in this section include, for example, sharing injection equipment with other drug users, use of bleach to disinfect injection equipment, and use of condoms during sexual intercourse. AIDS-risk attitudes include perceived efficacy of bleach and condoms in preventing AIDS and perceived risk of contracting AIDS. While AIDS-risk behaviors are the primary focus of this report, attitudes represent further useful information on AIDS risk. Low perceived efficacy of condoms, for example, is a dangerous sign if strongly associated with failure to use condoms. Section 3 findings were drawn in part from surveys conducted by the UCLA Drug Abuse Research Group. We have incorporated additional findings from several other sources, which are described in the text.

In Section 4, we re-examine the frequency of AIDS-risk behaviors and attitudes in multivariate regression analyses. The purpose of these analyses is to explore drug-user characteristics that might be associated with relatively high or low levels of AIDS risk among injection drug users in Los Angeles. Characteristics tested include demographic traits (such as age and gender), drug use patterns (such as drugs injected and use of crack), sex-related behavior (such as engaging in prostitution), and drug abuse treatment experience.

Section 5 compares trends in AIDS-risk behaviors among injection drug users in Los Angeles and San Francisco. Comparable data, covering 1986 to 1990, are available for two drug-related behaviors--sharing injection equipment and disinfecting injection equipment with bleach.

Section 6 presents a summary of findings and draws conclusions regarding current levels of AIDS risk among drug users in Los Angeles County.

METHODS

Data sources were identified through a "snowball" procedure. Representatives of the AIDS Program Office and the Drug Abuse Research Group jointly prepared an initial list of possible data sources. The initial list was based on personal knowledge and a systematic review of AIDS program rosters, such as the 1989-90 directory of state-funded AIDS education and prevention programs (California State Department of Health Services, 1989b) and a list of AIDS demonstration projects funded by the National Institute on Drug Abuse (NOVA Associates, 1989). We sent this initial list to sources named on it and to others involved in

local AIDS research, asking them to identify additional sources of seroprevalence or survey data on Los Angeles drug users. This procedure generated a final list of over 40 sources, each described in Appendix 1. Many sources focused solely on Los Angeles drug users; some had a wider range but included drug users who live in the Los Angeles area. In addition, some sources had already completed data collection, while others still in operation provided partial findings based on data collected thus far. Some sources agreed to conduct special analyses expressly for this report. (Those sources are identified in Acknowledgements.)

SECTION 2: HIV SEROPREVALENCE

Seroprevalence studies have been conducted among injection drug users enrolled in drug abuse treatment programs and among users found in non-treatment locations such as parks, street corners, health clinics, and homeless shelters. It is important to review treatment and non-treatment studies separately because the risk of HIV exposure is probably lower among injection drug users in treatment (Mascola et al., 1989). Upon treatment entry, drug injection is often reduced or eliminated (Ball et al., 1988; Batki et al., 1988). Even among clients who continue to use injectable drugs, injection equipment may be shared less often and disinfected more often, while use of shooting galleries may be less frequent (Abdul-Quader et al., 1987; Ball et al., 1988; Flynn et al., 1988; McCusker et al., 1990).

INTERPRETING DATA ON SEROPREVALENCE

Before reviewing results from the various studies, we wish to highlight two problems that can complicate the interpretation of seroprevalence data. First, self-selection of participants is a source of possible bias in voluntary studies. People who volunteer for HIV antibody testing may do so because they think they are at high risk (Kegebein and Zack, 1990). If so, voluntary studies may overestimate seroprevalence among injection drug users in general. Of course, people may avoid testing for the same reason (Hull et al., 1988). The more widespread this tendency, the greater the possibility of underestimating seroprevalence. Findings from voluntary seroprevalence studies cannot be definitive unless something is known about the relative strength of these countervailing tendencies. Moreover, comparing volunteer samples over time is complicated by recent developments in prophylactic treatment, which lately may have induced more people at high risk to accept testing (Cimons, 1989). An alternative is "blinded" studies, in which HIV tests are performed on blood specimens collected for other purposes. Sites for these studies include drug abuse treatment programs, hospitals, sexually transmitted disease clinics, and community health centers. Because findings are not based on people who seek HIV antibody testing, self-selection bias is presumably minimal (Centers for Disease Control, 1988; Ford, 1990). However, blinded studies do not have any special access to people who, for whatever reason, do not seek the services offered at study sites.

A second interpretive problem arises from possible differences in the composition of study samples. Seroprevalence findings could be affected by sample members' sexual orientation, gender, race/ethnicity, or primary drug of abuse. In urban areas outside the northeast United States, seroprevalence is considerably higher among gay/bisexual men than among injection drug users (National Academy of Sciences, 1988; Turner et al., 1989). HIV exposure due to injection drug use may therefore be overestimated in samples which include a sizable proportion of gay/bisexual drug users but which cannot be split into sexual-orientation subsamples. In San Francisco and cities of the northeast United States, drug-user seroprevalence rates appear higher for blacks and Hispanics than for non-Hispanic whites (Des Jarlais and Friedman, 1988; Turner et al., 1989; Watters and Lewis, 1990). In addition, some studies find seroprevalence to be higher for people who inject cocaine instead of, or in addition to, opiates (Amsel et al., 1990; Chaisson et al., 1989; Des Jarlais and Friedman, 1988; Iguchi et al., 1990; Nemoto et al., 1990; Watters et al., 1988a; Wiebel et al., 1990). Such patterns might not hold in Los Angeles but do indicate that seroprevalence rates found in different samples might be affected by the racial/ethnic and drug-preference composition of those samples. Finally, gender differences in drug-user HIV infection rates have not been clearly established, but some studies have found higher rates among women (Des Jarlais and

Friedman, 1987b; Lewis and Watters, 1988; Marmor et al., 1987).

We have handled these two problems as follows. First, in the study descriptions we indicate whether each study was blinded or voluntary. Refusal rates are also indicated if available in the original study. Most studies relied on volunteer participation and are therefore open to self-selection bias, but the degree of bias may be lower when refusal rates are lower.

Second, when possible we examined seroprevalence data within demographic and drug-preference subsamples. (This was usually not possible. Few studies linked test results with the background characteristics or drug preferences of sample members.) Results of our examination appear in Appendix 2 and are briefly summarized here. Studies reporting test results by sexual orientation find HIV infection rates higher, as would be expected, for gay/bisexual than for heterosexual drug users. But because the gay/bisexual proportion of these samples is consistently quite low, there is no appreciable difference between rates reported for full samples and rates for heterosexual subsamples. The overall effect of gay/bisexual participants is therefore probably small to nonexistent in studies reporting only full-sample rates. We also found that in some studies, seroprevalence rates are higher for men and for blacks. However, these gender and racial/ethnic differences are slight. Finally, we found no reliable indication that seroprevalence varies by primary drug of abuse (cocaine versus opiates). It therefore appears that seroprevalence rates can be compared across samples without adjusting for variability in sample composition.

Moreover, despite possible seroprevalence differences between drug-user subgroups, the most meaningful indicator of HIV infection risk among Los Angeles drug users is probably the overall pattern of findings based on full samples. We make this argument because subgroup lines are crossed in the social ecology of injection drug use. Injection equipment is often shared between men and women, gay and heterosexual users, heroin and cocaine users, and in mixed racial/ethnic groups. (See Appendix 2 for a detailed discussion of this point.)

DRUG USERS IN TREATMENT

Findings based on treatment samples are reported in Table 2.1. The first local studies occurred in 1986. Tennant (1987b) reported 1.0% seroprevalence in a volunteer sample of 200 heroin users who received outpatient methadone or naltrexone therapy at five Los Angeles clinics operated by Community Health Projects (CHP). (Tennant's report included data from 10 other clinics in neighboring counties. Seroprevalence was 1.2% across all 15 clinics, with a sample size of 416. See also Lange et al., 1988.) Also in 1986, the Los Angeles County Drug Abuse Program Office (DAPO) conducted antibody tests among volunteers (n=728) at 31 methadone maintenance/detoxification clinics. Seroprevalence was 1.8%. About 8% of clients approached by the study staff refused to participate (Mascola et al., 1989).

Further testing at Community Health Projects methadone maintenance/detoxification clinics (Tennant, 1987a) found a 1.2% seroprevalence rate in 1987 (n=171). As in Tennant's 1986 study, data were collected from some CHP clinics outside Los Angeles County. But because data were not identified by clinic location, seroprevalence reported for 1987 is not specific to Los Angeles County. During this same year, the National Institute on Drug Abuse (NIDA) began to monitor seroprevalence in several U.S. cities. Los Angeles results showed seroprevalence of 3.4% among volunteers (n=208) at an unspecified number of methadone maintenance/detoxification clinics (Battjes and Pickens, 1988; Battjes et al., 1990). Also in 1987, DAPO conducted testing in 19 residential drug-free programs.. All clients who used drugs cocaine, heroin, or amphetamines by injection were eligible. Seroprevalence was 4.8%

Table 2.1
HIV SEROPREVALENCE AMONG INJECTION DRUG USERS IN TREATMENT
LOS ANGELES COUNTY

	1986	1987	1988	1989	1990
METHADONE MAINTENANCE/DETOX (COMMUNITY HEALTH PROJECTS)	1.0% (n=200) VOLUNTARY	1.2% (n=171) VOLUNTARY	0.7% (n=149) VOLUNTARY		
METHADONE MAINTENANCE/DETOX (DRUG ABUSE PROGRAM OFFICE)	1.8% (n=728) VOLUNTARY	2.4% (n=502) VOLUNTARY	1.6% (n=508) VOLUNTARY		
METHADONE MAINTENANCE/DETOX (NATIONAL INSTITUTE ON DRUG ABUSE)		3.4% (n=208) VOLUNTARY	1.9% (n=426) VOLUNTARY	2.7% (n=260) VOLUNTARY	
RESIDENTIAL DRUG-FREE (DRUG ABUSE PROGRAM OFFICE)		4.8% (n=292) VOLUNTARY			
METHADONE MAINTENANCE/DETOX (AIDS EPIDEMIOLOGY PROGRAM)			1.6% (n=370) BLINDED	2.3% (n=1,960) BLINDED	2.0% (n=1,414) BLINDED

(n = 292) (Anglin and Arnold, 1987). A second DAPO study in that year covered 33 methadone maintenance/detoxification clinics and found 2.4% seroprevalence (n = 502). About 14% of clients approached by this study refused to participate (Arnold, 1988).

Seroprevalence was 0.7% in a 1988 volunteer sample (n = 149) of CHP methadone maintenance/detoxification clients (Tennant, no date). Some participating clinics were outside Los Angeles County. DAPO's 1988 survey of methadone maintenance/detoxification clients (n = 508) found a 1.6% seroprevalence rate (Drug Abuse Program Office, 1989). Los Angeles results for the 1988 wave of NIDA monitoring show 1.9% seroprevalence among volunteers (n = 426) at methadone maintenance/detoxification clinics (Battjes et al., 1990). About 22% of clients recruited in NIDA's 1988 study declined to participate (Battjes, 1989). (Refusal rates for other NIDA study years were not reported.) In 1989, NIDA's monitoring program found 2.7% seroprevalence among injection drug users in maintenance/detoxification clinics (n = 260).

Blinded seroprevalence testing for incoming clients began at four Los Angeles maintenance/detoxification clinics in 1988 and expanded to six clinics in 1989 (Ford, 1990). (Confidential testing is also conducted at these clinics but is subject to self-selection bias. We therefore focus on the blinded data.) Seroprevalence rates were 1.6% in the 1988 sample (n = 370) and 2.3% in the much larger 1989 sample (n = 1,960). Data available through November 1990 (n = 1,414) indicate a seroprevalence rate of 2.0%.

SUMMARY: DRUG USERS IN TREATMENT

Across 12 studies in clinics offering methadone maintenance/detoxification treatment, findings have varied only slightly--from 1% to 3%. Because opiates are the primary drug of abuse for clients treated with methadone, the conclusion suggested by these findings is that seroprevalence is probably no higher than 3% among opiate users in methadone maintenance/detoxification treatment. Regarding the possible bias introduced by participants' self-selection, we note that refusal rates were often high and that almost all studies relied on volunteers. However, as mentioned above, blinded surveys are not subject to self-selection. The county AIDS Epidemiology Program surveys were blinded, and they found seroprevalence between 2% and 3%--no higher than rates found in other studies.

Our confidence in these findings is nonetheless limited by two important facts. First, the number of clients tested per clinic is quite variable and often small in these studies. If clinic populations have different HIV infection rates, it may be misleading simply to combine the data across clinics. Second, the probability of sample inclusion may not have been equal for all clients at a clinic. Recruitment may have tapped into some social networks but not others and may have missed the majority of "take home" clients who do not attend their clinics every day. For both of these reasons, we do not know how precise these findings really are. In statistical terms, what are the confidence intervals? A rate of 2.5% might be reported, but the confidence interval around that rate could be narrow (with the actual rate between 2.2% and 2.8%, for example), or it could be very broad (with an actual rate perhaps as high as 20%). The low variability in findings across studies suggests that this problem may not matter much. But it is still important to emphasize that the conclusion from treatment studies--seroprevalence no higher than 3%--is based on data that are in some ways quite limited.

DAPO's 1987 study of clients in residential drug-free programs reported 4.8% seroprevalence. To our knowledge, no other study has reported seroprevalence among clients in such programs. Thus, while drug users who enroll in residential drug-free programs may have higher HIV infection rates, data are insufficient even for a tentative conclusion.

DRUG USERS NOT IN TREATMENT

Seroprevalence data have been collected from injection drug users in locations other than drug abuse treatment programs (see Table 2.2). These locations include "alternative test sites" offering HIV antibody testing, sexually transmitted disease clinics, jails, homeless shelters, and public places (such as parks and street corners) where drug users are known to congregate.

Anonymous HIV antibody testing/counseling is now available at seven alternative test sites (ATS) operated and/or funded by Los Angeles County. These are known as alternative test sites because they exist specifically for people who want the antibody test under anonymous conditions or who would otherwise be unlikely to seek antibody test services. In 1989, a total of 14,928 tests were conducted under the ATS program. Interviews with ATS clients indicated that about 7% (n = 1,022) had used drugs by injection. Among them, seroprevalence was 7.2%. From January to August 1990, a total of 11,084 tests were conducted. Seroprevalence for the injection drug use subsample (n = 629, about 6% of all tests) was 9.9%.

In summer 1990, Los Angeles County began offering HIV antibody testing to homeless adults at a health clinic in the downtown Skid Row area. Thus far, 203 cases who have requested confidential testing have also reported a history of injection drug use. Seroprevalence among them was 9.9%, matching the rate found at ATS sites in 1990. Blinded testing was conducted on another 53 cases, 3.7% of whom tested positive.

Collection of blinded seroprevalence data began at five Los Angeles County sexually transmitted disease (STD) clinics in 1988 and expanded to eight clinics in 1989 (Ford, 1990). (As noted above, confidential testing is also offered in the blinded-study clinics.) Limited data exist for 1988. Of 2,578 patients whose blood samples were blind-tested, only 3% (n = 75) reported a history of injection drug use; 8.0% of those patients were seropositive. In 1989, a total of 23,596 blinded HIV antibody tests were conducted. Among the 4% (n = 910) who reported injection drug use, seroprevalence was 5.9%. From January to November 1990, injection drug use was reported by 588 STD clients. Among them seroprevalence was 7.5%.

The UCLA AIDS Nursing Network, which began operation in 1989, focuses on black and Hispanic women at risk of HIV infection through drug use, prostitution, and other factors. Recruitment is conducted in parks, street corners, homeless shelters, health clinics, and drug abuse treatment programs. As of November 1990, the Nursing Network had enrolled over 1,100 women. Among those reporting a recent history of drug injection (use within the past six months), seroprevalence was 5.2%. The absolute number of injection drug users in this sample (n = 115) is small. The refusal rate is unknown.

Another street-based seroprevalence study is being conducted by the AIDS Research & Education Project at California State University, Long Beach. Beginning in 1988, the project has recruited injection drug users at social service agencies, parks, and street corners in Long Beach. Users currently in drug treatment are excluded from participation. Antibody tests conducted on 194 cases in 1988 indicate seroprevalence at 5.7%. Since 1988, the Long Beach project has recruited another 1,146 injection drug users. Seroprevalence has remained stable at 5.8% for 1989-90 (Rhodes, 1990a, 1990b). Refusal rates have not been reported for either the 1988 or the 1989-90 Long Beach study.

Finally, since 1987 the Drug Use Forecasting (DUF) Project has collected information on drug use patterns, AIDS risk, and other topics through interviews of arrestees held at county jails. Over 3,300 arrestees have been interviewed thus far; about 32% have reported ever using injection drugs. Refusal rates have been quite low (around 3% overall; Westland and Annon,

Table 2.2
HIV SEROPREVALENCE AMONG INJECTION DRUG USERS FROM NON-TREATMENT SAMPLES LOS ANGELES COUNTY

	1988	1989	1990
ALTERNATIVE TEST SITES		7.2% (n=1,022) CONFIDENTIAL	9.9% (n=629) CONFIDENTIAL
SKID ROW HEALTH CLINIC			9.9% (n=203) CONFIDENTIAL
			3.7% (n=53) BLINDED
SEXUALLY TRANSMITTED DISEASE CLINICS	8.0% (n=75) BLINDED	5.9% (n=910) BLINDED	7.5% (n=588) BLINDED
AIDS NURSING NETWORK			5.2% (n=115) VOLUNTARY
LONG BEACH STREET OUTREACH	5.7% (n=194) CONFIDENTIAL		5.8% (n=1,146) CONFIDENTIAL

1989). The DUF Project does not conduct antibody testing but does ask arrestees to indicate their serostatus if known. To date, 175 arrestees have reported being aware of their serostatus, and four (2.3%) said they were antibody positive (data not shown in Table 2.2).

SUMMARY: DRUG USERS NOT IN TREATMENT

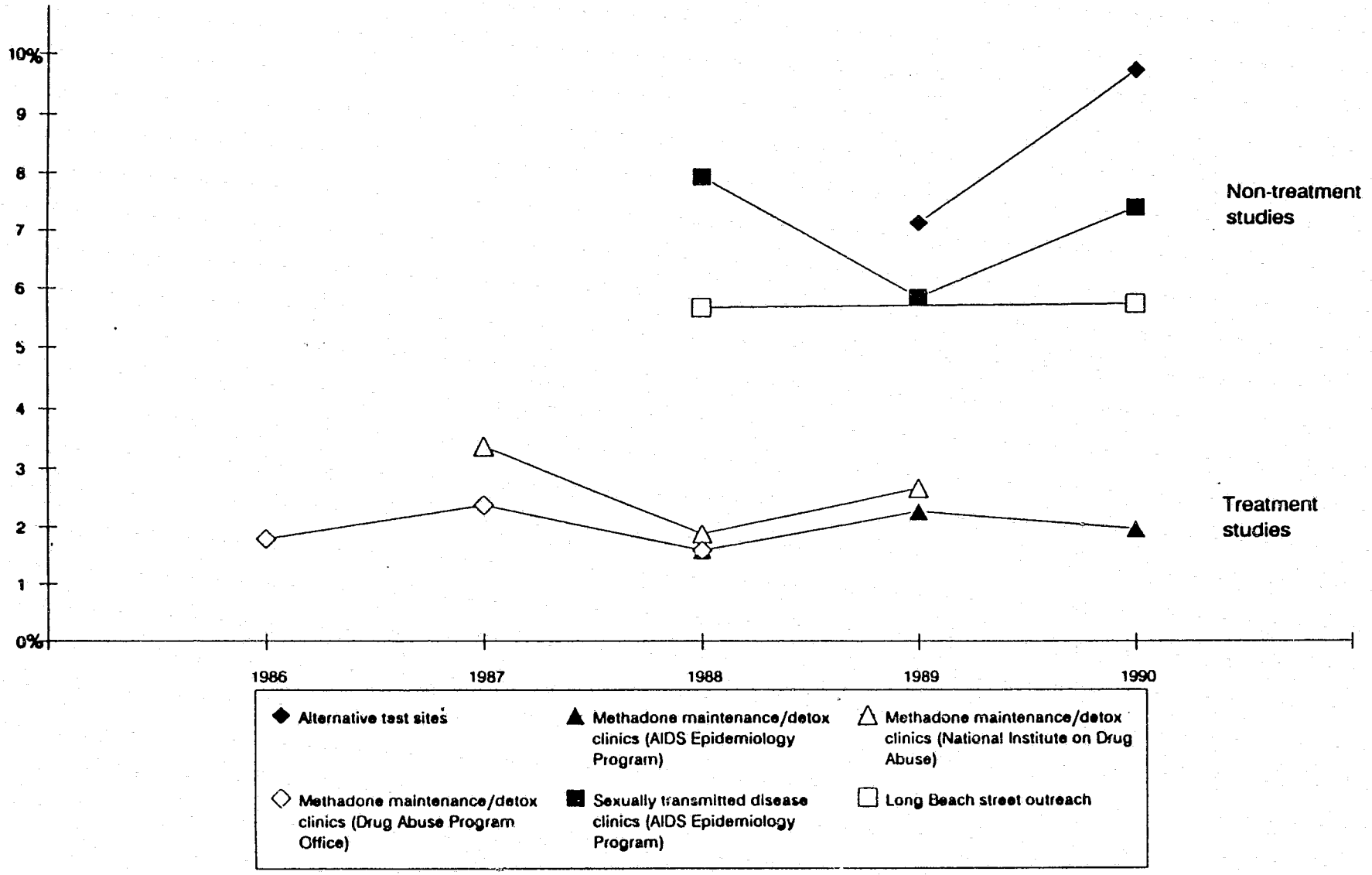
Across 10 studies testing the serostatus of injection drug users at non-treatment locations, HIV infection rates have varied from 4% to 10%. Regarding possible bias from volunteer self-selection, we note first that alternative test sites exist specifically to provide HIV antibody testing. Many people who sought ATS services may therefore have been at higher AIDS risk than those who did not. The same is true for the homeless injection drug users who sought confidential testing at the County's Skid Row health clinic. ATS and homeless seroprevalence rates are concordant with this possibility. At 7% to 10%, they are higher than rates found in other non-treatment studies. Second, because of its low refusal rates, the DUF Project is less subject to self-selection bias than some other non-treatment studies. But the DUF finding (2.3% seropositive) is based on self-reported antibody test results, not on independent testing, and the number of DUF arrestees who knew their serostatus was low. Finally, blinded surveys are not subject to volunteer self-selection bias. Seroprevalence figures from the large, blinded surveys of county STD clinics might therefore be considered most reliable. However, compared to injection drug users overall, those who attend STD clinics may be at somewhat higher risk of AIDS through sexual transmission. Even the blinded STD-clinic data are therefore not definitive.

Our tentative conclusion is that seroprevalence is probably no higher than 8% among injection drug users not in treatment. As with treatment-based seroprevalence studies, the non-treatment studies have some additional limitations. Sample sizes are small in some of them, and the probability of sample inclusion was surely not equal for all drug users. For example, street-based recruitment in the Long Beach and Nursing Network studies may have tapped some social networks more extensively than others and surely missed many users who are just not accessible through street outreach. More importantly, even the blinded studies lack access to people who do not seek the services offered at study sites. Thus, although the non-treatment studies indicate seroprevalence no higher than 8%, we reiterate the caution expressed with regard to the treatment-based studies; this finding is based on data that are not definitive.

POSSIBLE TREND IN SEROPREVALENCE

When treatment and non-treatment studies are examined together, the pattern of findings suggests a possible increase in seroprevalence over the past two years. Figure 2.1 presents seroprevalence data from selected studies in graph form. Among treatment studies, we selected annual studies by NIDA in 1987-89, another three annual studies by DAPO in 1986-88, and three annual studies by the AIDS Epidemiology Program in 1988-90. All of these studies were based in methadone maintenance/detoxification clinics. Among non-treatment studies, we selected those from alternative test sites in 1989-90, STD clinics in 1988-90, and Long Beach in 1988-90. The rationale for selection is that data from such studies are comparable across years (Onorato et al., 1989); the samples were apparently drawn from similar drug-user populations by similar procedures each time. Excluded from Figure 2.1 are DAPO's 1987 residential treatment sample and the DUF, Nursing Study, and homeless-study samples. Each of these studies represents one year only; and, except for DAPO's, each is based on relatively few cases. Also excluded are the CHP studies, which were conducted largely in clinics outside Los Angeles County.

Figure 2.1
POSSIBLE TREND TOWARD INCREASING HIV SEROPREVALENCE LOS ANGELES COUNTY



Within the treatment and non-treatment study categories, yearly seroprevalence rates in Figure 2.1 are quite similar. But, with the sole exception of the Long Beach study, later rates show some upward movement. The increase occurs later in non-treatment samples (1989-90) than in treatment samples (1988-90). In the AIDS Epidemiology Program's treatment samples, the increase from 1988 to 1989 does not persist into 1990. However, the overall pattern may be a sign of rising HIV infection among Los Angeles drug users.

Plausible alternative explanations should be noted. People who thought their AIDS risk was high may have been more likely to accept testing when it was first offered. If so, seroprevalence would have been high initially, then lower as the ratio of high- to low-risk cases dropped. Rates could have increased again recently as news of prophylactic treatment renewed the motivation of users at highest risk. Another strong possibility is that the slight increase shown in Figure 2.1 is due to random fluctuations in sampling. We therefore believe that no conclusion, however tentative, can be drawn regarding time trends in these studies. The pattern is cited as a possibility that cannot be confirmed or disconfirmed without additional data.

CONCLUSION

Available data are limited in some important ways but suggest that seroprevalence is probably no higher than 3% for injection opiate users in methadone maintenance/detoxification programs and probably no higher than 8% among injection drug users not in treatment programs. There is no obvious trend in seroprevalence over the five years for which data are available, but it is possible that seroprevalence has increased in the past two years.

SECTION 3: AIDS RISK BEHAVIORS AND ATTITUDES

In this section, we review the frequency with which AIDS-related behaviors and attitudes are reported in various samples of Los Angeles drug users. Most of the available evidence covers the behaviors and attitudes of injection drug users. We present that evidence first. We then review limited evidence on AIDS-related behaviors among three additional categories of drug users: smokers of crack cocaine, high-risk adolescents, and homeless adults. Behaviors and attitudes examined in this section are summarized in Table 3.1.

Discussion is organized around findings from the Drug Use Forecasting (DUF) project. Funded by the National Institute of Justice, DUF assesses drug-use patterns and trends in 25 cities nationwide. DUF in Los Angeles is coordinated by the UCLA Drug Abuse Research Group. On a quarterly basis, information is collected on drug use, other AIDS-related behaviors, and AIDS-related attitudes through interviews with arrestees held at Los Angeles County jails. Interviews usually occur within three days after the arrest. DUF began in Los Angeles in late 1987, was suspended in late 1988, then resumed in late 1989. The most recent quarter available for analysis is early 1990. About 3,300 arrestees have been interviewed overall, and 32% (n = 1,056) have reported using injection drugs. (Appendix 1 supplies more information on the DUF project.)

DUF's unique value is its record of trends. Most questions on the interview form are similar for all seven DUF quarters, so it is possible to trace the frequency of specific behaviors and attitudes from 1987 to 1990. The scope of AIDS-related questions was expanded in mid 1988, providing additional data for the four most recent DUF quarters. Furthermore, DUF sample composition has fluctuated very little from quarter to quarter. Racial/ethnic and gender proportions are essentially the same each time (for example, men comprise 63% to 70% of each DUF sample), and the percentage of men reporting same-sex contact is always low (2% to 3%). There is some variability, but no consistent increase or decrease, in the quarterly percentage of DUF arrestees who have used heroin, powder cocaine, or crack. We can therefore base our analyses on the full subsamples of injection drug users, leaving for Section 4 the assessment of possible differences between demographic and drug-preference groups.

The DUF sample is composed entirely of arrestees, and few of the injection drug users interviewed in DUF (about 5% each quarter) have been enrolled in drug abuse treatment at the time of arrest. DUF findings may therefore not be generalizable to injection drug users in treatment or to those less involved in criminal activity. There is, however, reason to believe that DUF provides a rough approximation of trends occurring more widely among Los Angeles drug users. Several variables measured in DUF have also been measured in cross-sectional surveys conducted at treatment clinics and other locations. When we compare DUF findings for any given year with same-year findings from other surveys, answers are often (though not always) consistent. This pattern of findings is described in detail below. The cross-sectional surveys to which DUF data are compared are listed in Table 3.2.

INJECTION DRUG USERS

We begin with indicators of drug-related AIDS risk, such as the frequency with which arrestees report that they no longer inject drugs or share injection equipment. Thereafter we turn to sex-related indicators such as the frequency of condom use.

TABLE 3.1: AIDS-RELATED BEHAVIORS AND ATTITUDES

BEHAVIORS (DRUG-RELATED)

Elimination of injection drug use
Entry into drug abuse treatment
Sharing injection equipment
Sharing injection equipment with strangers
Drug injection in "shooting galleries"
Use of bleach to disinfect injection equipment

BEHAVIORS (SEX-RELATED)

Number of sexual partners
Condom use during sexual intercourse
Sexual intercourse under the influence of alcohol/drugs

BEHAVIORS (OTHER)

Seeking HIV antibody testing

ATTITUDES

Perceived efficacy of bleach in reducing AIDS risk
Perceived efficacy of condoms in reducing AIDS risk
Perceived risk of contracting AIDS

TABLE 3.2: CROSS-SECTIONAL SURVEYS CITED IN SECTION 3*

SOURCE	SAMPLE	DATA COLLECTION PERIOD
Childrens Hospital of Los Angeles (two samples)	Homeless adolescents in Hollywood	1985, 1990
Los Angeles County Drug Abuse Program Office (DAPO) (three samples)	Clients in methadone maintenance/detoxification (two samples); clients in residential treatment (one sample)	1986-87
Alcohol Research Group	Homeless adolescents in Hollywood	1987
National Institute on Drug Abuse (three samples)	Clients in methadone maintenance/detoxification	1987-89
Los Angeles County Juvenile Court Health Services	Adolescents held in county detention facilities	1987-89
Los Angeles County AIDS Epidemiology Program	Clients in methadone maintenance/detoxification	1988-90
AIDS Research & Education Project (two samples)	Long Beach drug users recruited in street outreach	1988-90
UCLA Follow-up Study	Random selection of cases from 1986-87 DAPO surveys	1989-90
UCLA AIDS Nursing Network	High-risk women at homeless shelters, treatment clinics, and social service agencies	1989-90
Women and AIDS Risk Network	High-risk women at treatment clinics, jails, and social service agencies	1989-90
Project MAMA	High-risk pregnant women recruited in health clinics, social service agencies, and street outreach	1990

*Full descriptions of the surveys appear in Appendix 1.

TABLE 3.2 (CONTINUED): CROSS-SECTIONAL SURVEYS CITED IN SECTION 3

SOURCE	SAMPLE	DATA COLLECTION PERIOD
Los Angeles County Drug Abuse Program Office (DAPO)	Drug users recruited in street outreach	1990
Los Angeles Homeless Health Care Project	Incoming clients at homeless shelters	1990

ELIMINATING INJECTION DRUG USE AND/OR ENTERING TREATMENT

Findings recently released by the Centers for Disease Control suggest that some drug users have responded to the risk of AIDS by entirely eliminating their illicit drug use and/or entering drug abuse treatment (Morbidity and Mortality Weekly Report, 1990). In non-treatment samples of injection drug users in five U.S. cities (not including Los Angeles), between 16% (in Chicago) and 47% (in Miami) reported eliminating injection drug use during the previous six months. The average percentage across cities was 28%. Between 14% (in Miami) and 35% (in San Francisco) reported entering drug abuse treatment within the past six months (23% across all five cities). These changes cannot be attributed solely to AIDS risk, but additional research (e.g., Des Jarlais and Friedman, 1987b; U.S. Office of Technology Assessment, 1988) indicates that fear of AIDS has increased treatment demand.

In DUF data combined across all seven quarters, 31% of arrestees who have ever used injection drugs reported no such use in the past six months. This percentage varies only slightly (from 29% to 33%) when data are examined by quarter. Also, as noted above, there is no change in the (always low) percentage of arrestees currently enrolled in treatment.

SHARING INJECTION EQUIPMENT

A major source of AIDS risk is sharing drug injection equipment. Blood left in the needle or syringe might be contaminated with HIV, as might the cooker (such as a bottle cap) in which drugs are heated and dissolved for injection, the cotton used to strain the drug solution as it is drawn into the needle, or the water in which the needle and syringe are rinsed (Turner et al., 1989).

AIDS risk is probably lower if sharing occurs exclusively within a small social network--between spouses or "drug buddies" for example. Moreover, AIDS risk is apparently nil if shared equipment is disinfected between injections, provided that an effective agent (e.g., bleach) is used properly and consistently. But sharing incurs some degree of risk whenever users do not know for certain that each other's sharing habits are exclusive and that all network members are seronegative. Even among drug users who are generally careful about disinfecting shared equipment, the habit or necessity of sharing may entail some risk of AIDS. Social pressure, withdrawal symptoms, or bad judgment may lead them to forgo disinfection on some occasions (Connors, 1989; Friedman et al., 1987a, 1987b; Murphy, 1987; Selwyn et al., 1987). For these reasons, sharing is treated here as risky behavior even though risk might be avoided in particular sharing episodes and circumstances. We cover disinfection practices below.

There may have been a decrease in the frequency with which injection equipment is shared. In 1988, 92% of DUF arrestees who were active drug-injectors (n=125) reported sharing injection equipment at some time in the preceding year. This high rate of sharing is confirmed in other, cross-sectional studies conducted that same year. The street-based survey of Long Beach injection drug users (n=325) found that 88% shared (Rhodes et al., 1990a). NIDA's treatment-clinic survey of incoming users (n=427) found 87% (Battjes et al., 1990); DAPO's treatment-clinic survey, 83% (n=310) (Drug Abuse Program Office, 1989). (As noted above, AIDS risk behaviors may be less frequent among treatment clients, even those who still use injection drugs. The DAPO survey is therefore of less value for comparison with the non-treatment DUF data. The NIDA survey is more valuable because incoming clients were sampled; questions therefore pertain to behaviors that preceded entry into treatment.) In 1989 there were two quarters of DUF data collection, and sharing was reported by 75% to 83% of arrestees (combined n=286). These rates are quite close to the 83% found in NIDA's 1989

study (n=261) and the 73% found in the AIDS Epidemiology Program's survey of treatment clients (n=560) in 1988-89 (Kerndt et al., 1990; Rose, 1989). In 1990 the DUF sharing rate dropped back to 75% (n=131). This is close to the 77% found in the AIDS Epidemiology Program's 1990 survey of treatment clients (Kerndt et al., 1990) and the 79% found in the Drug Abuse Program Office's 1990 street-based survey (n=495) (Webb et al., 1990). These rates are slightly higher than rates reported in three other 1989-90 studies. The AIDS Nursing Network found 66% among active drug-injectors (n=115); the Women and AIDS Risk Network, 68% (n=299); UCLA's Follow-up Study, 69% (n=214).

In summary, sharing seems to have decreased, though erratically, since 1988. DUF findings for 1988 to 1990 are shown in Figure 3.1 (shared in past year). Using Bartholomew's chi-square statistic (Fleiss, 1981), we tested the DUF findings to see whether this decline in sharing has been large enough to attain statistical significance. If so, it can be assumed that the trend reflects actual change, not just differences in the composition of DUF samples. Results indicate that the trend approaches statistical significance ($p<0.1$). We therefore believe that DUF findings probably reflect actual change, though sample-composition differences cannot be ruled out.

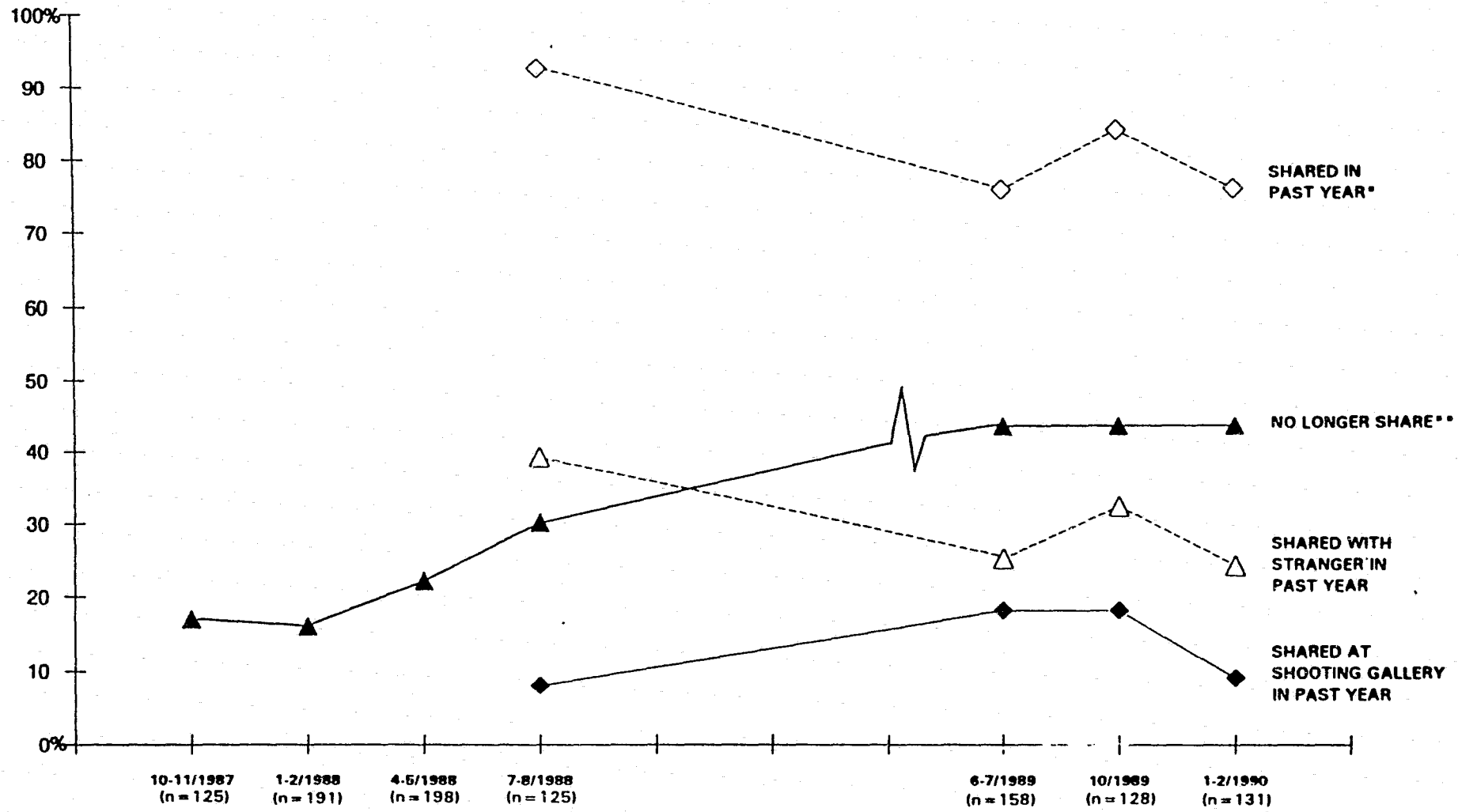
Evidence is stronger for a closely related trend, namely, the percentage of arrestees who say they no longer share injection equipment. (The DUF question covered above asked arrestees whether they shared at any time during the past year. Arrestees who "no longer share" could have shared sometime during the past year but then stopped.) In 1987, 17% of arrestees said they had stopped sharing. By 1988 the percentage increased to 29%. Since then it has leveled off at 43%. The relevant question was revised in 1989, so data may not be comparable across all DUF quarters. That problem aside, the DUF trend shown in Figure 3.1 (no longer share) is clearly strong enough to reach statistical significance ($p<.005$).

DRUG USE WITH STRANGERS AND IN SHOOTING GALLERIES

AIDS risk is higher when sharing occurs among drug users who do not know each other well (Chaisson, 1987b; Des Jarlais and Friedman, 1988). Strangers who share injection equipment in one drug-user network may also share in other networks, whose members may share in still more networks. As these second-hand contacts multiply, each sharing partner stands an ever-increasing chance of exposure to HIV. This sort of risk may be highest in shooting galleries--apartments, abandoned buildings, and other places where injection equipment is provided in exchange for drugs or rented. Many people, often anonymous to each other, may use the "house works" during any given day (Des Jarlais and Friedman, 1987a; Watters, 1989).

In 1988, 39% of DUF arrestees reporting sharing with strangers or acquaintances during the previous year. Responses to the same question fluctuated from 25% to 32% in 1989, then dropped to 24% in 1990. The trend shown in Figure 3.1 (shared with stranger in past year) does not reach statistical significance. UCLA's Follow-up Study and the Women and AIDS Risk Network (WARN), both of which conducted interviews in 1989-90, have data on this question. In the Follow-up, 23% of cases still using injection drugs (n=214) reported sharing with strangers during the past year. In WARN, 27% of injection drug users (n=299) reported sharing with strangers during the past six months. The Drug Abuse Program Office street-based survey in 1990 (n=495) found 22% (Webb et al., 1990). These findings (none treatment-based) are quite close to the DUF findings for 1989-90.

Figure 3.1
SHARING TRENDS AMONG INJECTION DRUG USERS
LOS ANGELES COUNTY
DRUG USE FORECASTING PROJECT ARRESTEES



* TREND NEARLY SIGNIFICANT, $p < 0.1$
** TREND SIGNIFICANT, $p < 0.005$

Further details on the characteristics of drug-user social networks are available from the Follow-up Study. Of 214 active drug-injectors interviewed thus far, 52% have reported that the people with whom they share are always the same. Only 5% have said their sharing partners are always or usually different. On a related question, 51% have said that when they inject drugs they are always at home or nearby (within five miles). These findings suggest that sharing is confined to small, familiar networks for perhaps half of the users who are currently sharing injection equipment.

No trend is apparent in the DUF data on use of injection drugs at shooting galleries; see Figure 3.1. In 1988, 8% of arrestees reported injection drug use at a shooting gallery some time in the previous year; for both of DUF's 1989 quarters, the rate was 18%. In 1990, the rate dropped back to 9%. Across all quarters, the average percentage of arrestees reporting use of shooting galleries is 13%. Without more consistent evidence, it seems best to conclude simply that DUF finds no indication of widespread use of shooting galleries among injection drug users.

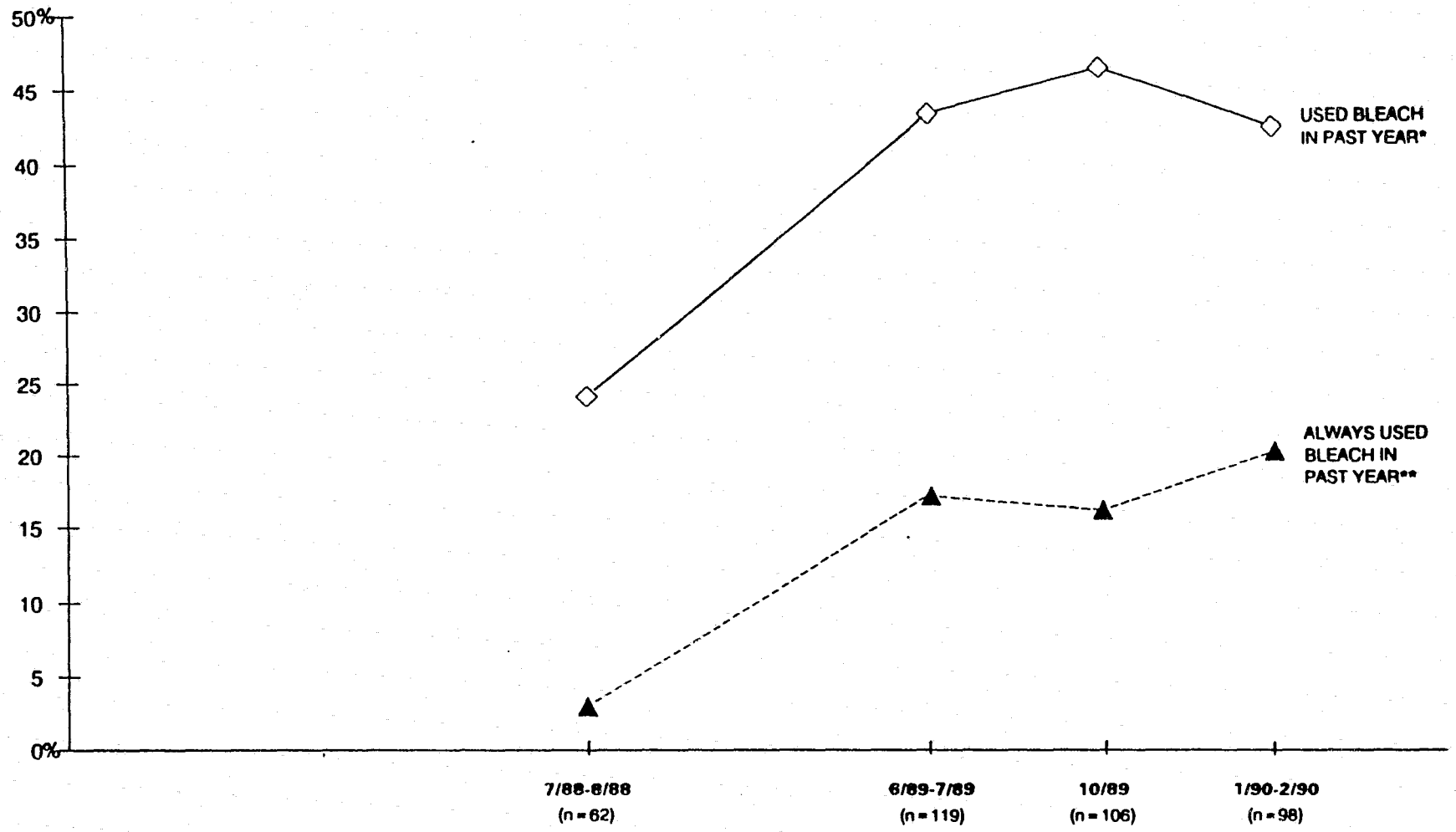
However, other studies indicate that DUF data may be anomalous with respect to both the current low rate of shooting-gallery use and the possibility of a trend toward less frequent use. First, rates of past-year use in shooting galleries are somewhat higher in the 1989-90 Follow-up Study (20% of 214 active drug users), in Project MAMA (28% of the subsample of high-risk women who inject drugs, n=99), in the Drug Abuse Program Office street-based survey (31%, n=493), and in the WARN study of high-risk women (22%, n=299). DUF findings, which ranged from 9% to 18% in 1989-90, may therefore underestimate current use of shooting galleries. Second, rates of past-year use in shooting galleries were 45% in NIDA's 1987 sample of incoming treatment clients (n=207), 41% in the 1988 sample (n=429), then 22% in the 1989 sample (n=261). The decrease across the three NIDA samples is statistically significant ($p < .0001$; Battjes et al., 1990) and suggests that DUF's failure to identify a trend in shooting-gallery use may not be generalizable to the wider population of Los Angeles injection drug users.

DISINFECTION WITH BLEACH

Analyses reported here are restricted to drug users who shared injection equipment during the specified time period (six or twelve months) preceding the interview. Reported past-year disinfection with bleach was 24% in the 1988 DUF sample (n=62 sharers) and rose to 42% by 1990 (n=98 sharers). Users reporting that they always disinfected with bleach rose from 3% in 1988 to 20% in 1990. These findings are shown in Figure 3.2. Again using Bartholomew's test, we found that the trend for any bleach use is nearly strong enough to be considered statistically significant ($p < 0.1$), while the trend for always using bleach is statistically significant ($p < .01$).

In a 1987 DAPO treatment-client sample, 19% (n=421 sharers) reported disinfection with bleach--close to DUF's 24% in that year. But data comparisons are not entirely consistent for subsequent years. Although greater AIDS risk would be expected among users not enrolled in treatment, the street-based Long Beach study in 1988 found a much higher percentage (45%) of cases (n=325) reporting use of bleach. The Follow-up Study found some use of bleach among 66% of users who shared injection equipment in 1989-90 (n=152). Two 1989-90 studies of high-risk women, the WARN project (n=202 sharers) and Project MAMA (n=99) found bleach-use rates of 66% and 62% respectively--rates much higher than DUF's comparable rates of 42% to 46%. On the other hand, 47% of high-risk women in the 1989-90 AIDS Nursing Network (n=76 sharers) reported bleach use in the past six months, and 40%

Figure 3.2
BLEACH USE TRENDS AMONG INJECTION DRUG USERS
LOS ANGELES COUNTY
DRUG USE FORECASTING PROJECT ARRESTEES
(cases sharing injection equipment)



* TREND NEARLY SIGNIFICANT, $p<0.1$
** TREND SIGNIFICANT, $p<0.01$

of the AIDS Epidemiology Program's 1990 treatment sample (n = 1,386 sharers) reported bleach use in the past year (Kerndt et al., 1990). Both rates are quite close to the DUF rates. Also, the 1990 percentage of DUF arrestees who reported always using bleach (20%) is matched by the 20% found in the Follow-up Study and close to the 17% found by WARN. DAPO found a slightly higher percentage of cases always using bleach, 26% in 1989-90, perhaps because the DAPO study surveyed drug users in treatment (n = 588) (Rose, 1989). Overall findings on bleach use are, in short, mixed. Some studies suggest that DUF may be underestimating bleach use.

NUMBER OF SEX PARTNERS

DUF data do not indicate that injection drug users are reducing their number of sex partners. In early 1988, 66% of arrestees (n = 198) reported having more than one sex partner in the past year. Subsequent DUF findings vary only slightly. In early 1990, 70% reported more than one partner in the past year (n = 131). See Figure 3.3. To set a more stringent criterion for this source of AIDS risk, we also examined the frequency with which arrestees reported five or more past-year sex partners. Findings suggest that this source of risk is increasing. In early 1988, 34% of DUF arrestees reported five or more partners. By early 1990, the percentage of arrestees with five or more past-year partners was 41%. This increase is strong enough to reach statistical significance ($p < 0.05$); it is apparently not a fluke due to sample-composition differences.

Two other studies from 1989-90, the Follow-up and WARN, suggest that DUF data may not accurately reflect this aspect of AIDS risk among injection drug users. Both studies found somewhat lower percentages reporting more than one sex partner, 47% in the Follow-up (n = 314) and 55% in WARN (n = 299). The Follow-up also found 17% reporting at least five sex partners in the past year--much lower than DUF's 34% to 41% for a comparable time period. Sample differences in age distribution, living arrangements, and prostitution rates may help to explain these discrepancies. We explore the role of such factors directly in Section 4.

CONDOM USE

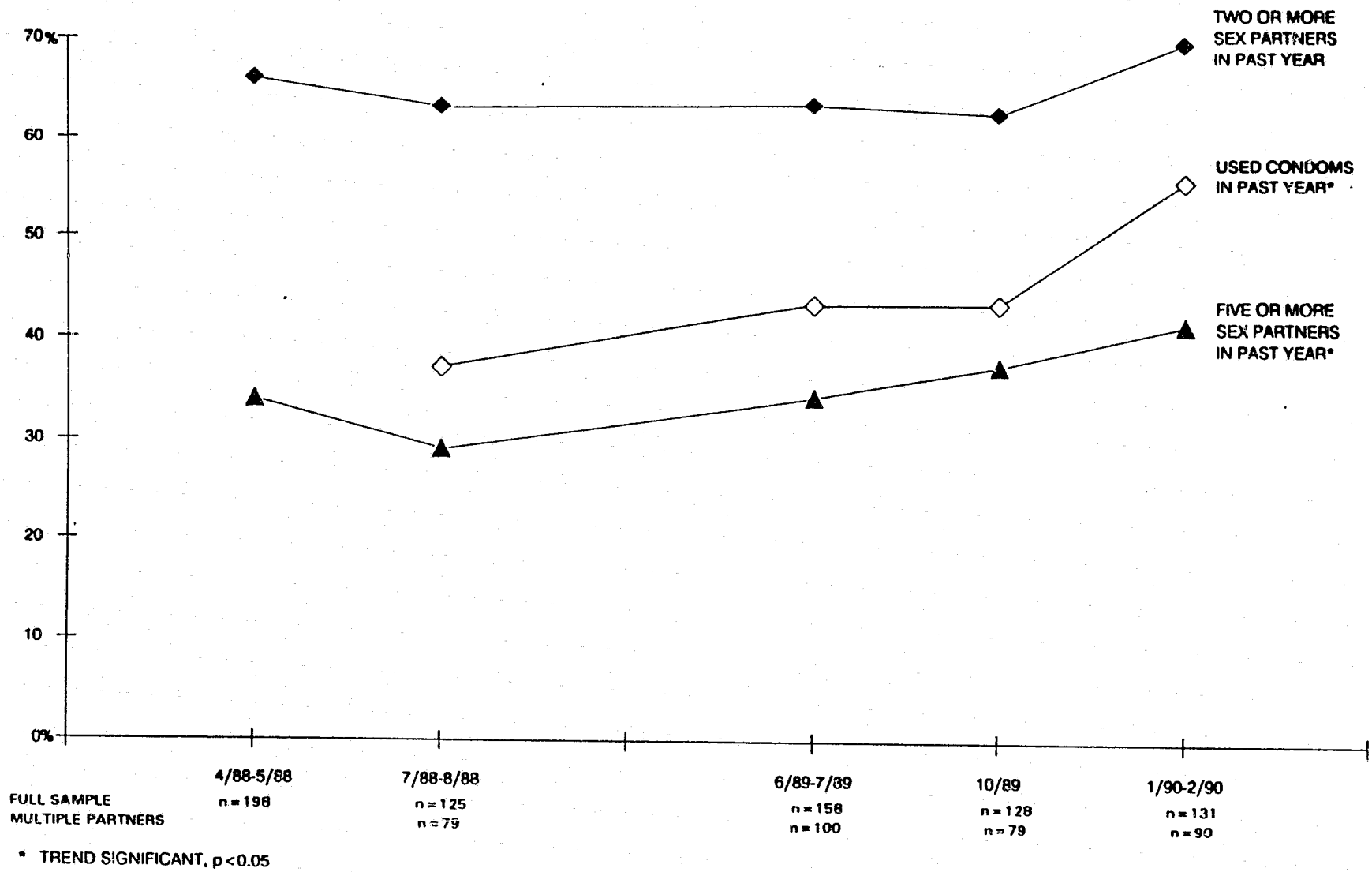
Among DUF arrestees reporting more than one sex partner in the past year, the rate of past-year condom use has increased from 37% in 1988 (n = 79) to 55% in 1990 (n = 90). See Figure 3.3. The trend is strong enough to be considered statistically significant ($p < .05$).

Data from cross-sectional studies are consistent with DUF. Two DAPO treatment-based studies in 1987 found that 29% of cases with more than one sex partner reported condom use (n = 479). This finding squares with later increases in DUF's 1988-90 data. The 1989-90 Follow-up Study found 57% condom use among drug users with more than one sex partner (n = 148). WARN found 50% for the same time period (n = 163). Both findings are close to the 55% found by DUF in early 1990.

SEX UNDER THE INFLUENCE OF ALCOHOL/DRUGS

Sexual behaviors through which HIV is transmitted are more likely if sexual intercourse occurs when either partner is under the influence of alcohol or other drugs (Miller et al., 1990). People who would otherwise avoid AIDS risk (through sex with strangers or sex without condoms, for example) may not do so if alcohol/drug use before or during intercourse impairs

Figure 3.3
SEX-RELATED TRENDS AMONG INJECTION DRUG USERS
LOS ANGELES COUNTY
DRUG USE FORECASTING PROJECT ARRESTEES



* TREND SIGNIFICANT, $p < 0.05$

their judgment or lowers their inhibitions.

Across DUF quarters, 88% of injection drug users (n=344) had sex while high on alcohol or drugs on at least some occasions; 53% said they were always or nearly always high. While there is no apparent trend in these responses over time, using alcohol/drugs during sex is clearly associated with sex-related AIDS risk. Injection drug users who reported always or nearly always being high during sex were more likely than others to report multiple sex partners (five or more in the past year). Specifically, 48% of arrestees who were always or nearly always high (n=209) had at least five past-year sex partners, compared to 28% of arrestees who were high less often or never (n=183) (p=.0001). On the other hand, there is no association between alcohol/drug use during sex and the likelihood of condom use. Among injection drug users who had multiple sex partners and were always/nearly always high during sex (n=169), 57% reported no past-year condom use, compared to 59% of those who were high less often or never (n=102).

Findings became even more emphatic when we repeated these analyses for the entire DUF sample (n=1,221). About 30% of all DUF arrestees were always or nearly always high during sex. Half (51%) of them reported at least five past-year sex partners, compared to 11% among the other arrestees (n=861). Among arrestees with multiple sex partners, the percentages reporting no condom use were quite similar: 52% for arrestees who were always or nearly always high (n=283), 46% for others (n=455).

Evidence is also available from two cross-sectional studies of injection drug users. In their summary of the 1988 Long Beach street-based study, Rhodes et al. (1990a) reported that condom use and "other risk-reduction strategies" were no less likely among cases regularly using alcohol or drugs during sex than among cases doing so infrequently or not at all (data not reported). In the UCLA Follow-up Study, 79% of cases who were high during sex always or almost always (n=63) reported having more than one sex partner in the past year, compared to 49% of other cases (n=124). As in DUF and the Long Beach study, rates of past-year condom use among cases with more than one sex partner did not differ--42% for those always/almost always high (n=50), 46% for others (n=61). (Follow-up Study cases currently enrolled in methadone maintenance were presumably always or almost always under the influence of methadone. Those cases were excluded from the analyses reported above.)

Although no relationship appears between alcohol/drug use during sex and condom use, data were available only for the overall frequency of condom use during the past year, not for the frequency of condom use on occasions when people were high. Any actual relationship between alcohol/drug use and condom use might therefore be obscured in the data we have. On the other hand, there is a consistent relationship between alcohol/drug use and multiple sex partners, in keeping with the assumption that alcohol/drug use creates psychological states (poor judgment and low inhibitions) that are conducive to higher AIDS risk. Of course this relationship is not necessarily causal. The regular use of alcohol/drugs during sex and multiple partners may both simply be elements of a broader life-style defined by marital status, youth, or other personal background characteristics (Miller et al., 1990). We explore this possibility in Section 4. We also emphasize, however, that causal interpretation does not matter much for our purposes. Regardless of whether alcohol/drug use during sex contributes independently to AIDS risk, it is part of a closely related complex of behaviors through which HIV infection can occur. The same is true regarding condom use. Failure to use condoms, though not found to be associated with alcohol/drug use during sex, is nevertheless common among people who have sex with multiple partners and who are often under the influence of alcohol/drugs during sex.

HIV ANTIBODY TESTING/COUNSELING

Concern over possible AIDS risk may be reflected in rates at which drug users seek HIV antibody testing. In 1988, only 19% of DUF arrestees who used injection drugs (n=67) reported having been tested. In 1989 the percentage rose to 46-47% (n=286), then to 53% in 1990 (n=131). This trend, shown in Figure 3.4, is strong enough to be considered statistically significant ($p<.005$). Testing was widely available and well publicized by 1988. It is therefore unlikely that the trend is due simply to increasing awareness of testing services.

PERCEIVED EFFICACY OF BLEACH

In 1988, a bare majority (52%) of DUF arrestees believed that disinfecting injection equipment with bleach is an effective means of avoiding AIDS. By 1990 this percentage increased to 79%. The trend, shown in Figure 3.5, is statistically significant ($p<.0001$).

Cross-sectional studies are consistent with DUF. In the 1989-90 Women and AIDS Risk Network (WARN) study, a comparable 85% of injection drug users (n=299) agreed that bleach is effective. In the 1989-90 Follow-up, 84% agreed that bleach is effective (n=354).

PERCEIVED EFFICACY OF CONDOMS

In 1988, 76% of the DUF arrestees believed that condoms are an effective means of avoiding AIDS. By 1990, this belief was nearly unanimous (94%). The trend, also shown in Figure 3.5, is strong enough to be considered statistically significant ($p<.05$).

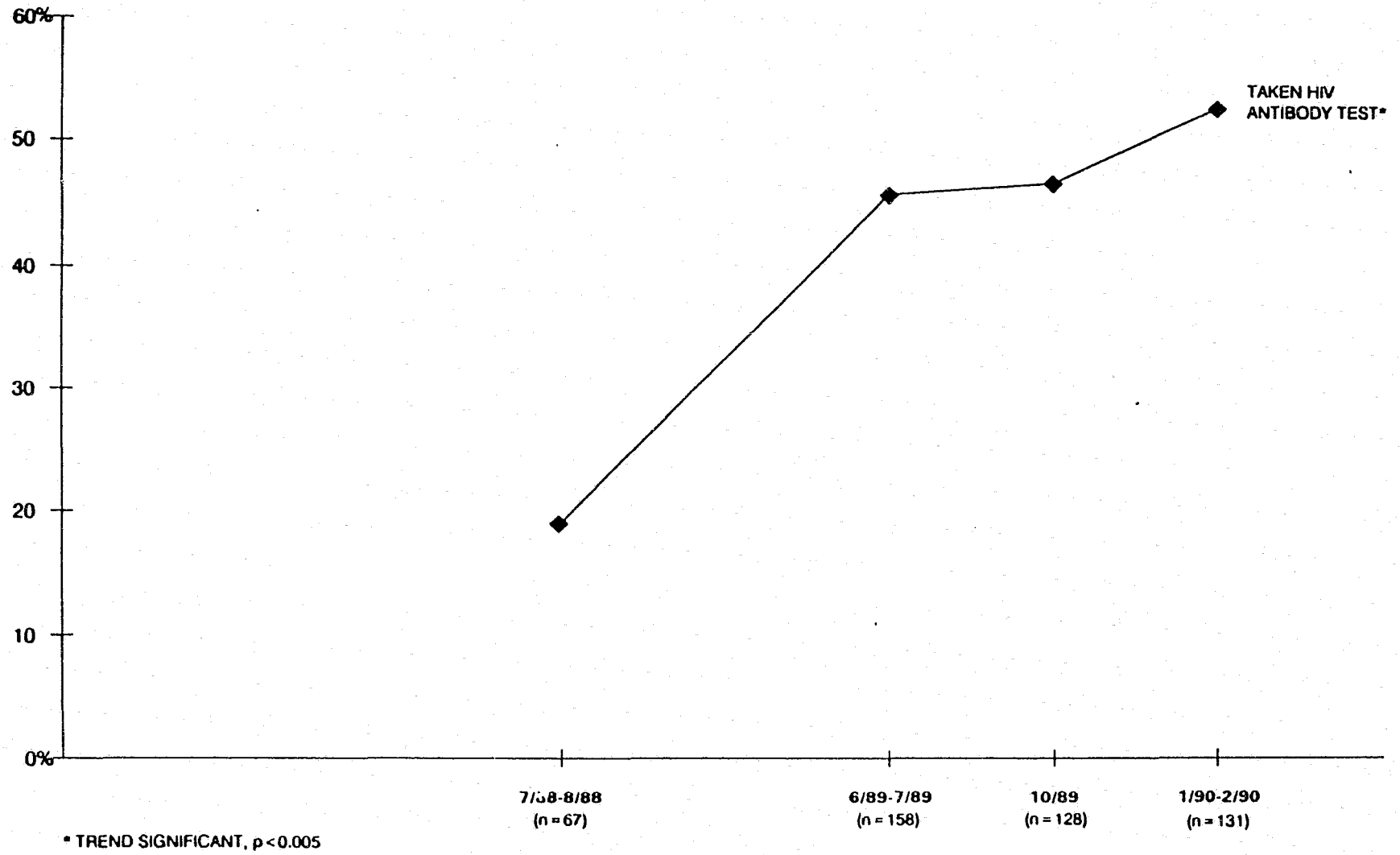
Again, cross-sectional studies are consistent with DUF. Most (89%) of WARN's injection drug users (n=299) agreed that condoms are effective, as did almost all (97%) of cases in the Follow-up Study (n=354).

PERCEIVED AIDS RISK

The percentage of injection drug users who think that the risk of AIDS is no higher for them than for "other people" has increased from 61% in 1988 to 70% in 1990 (see Figure 3.5). When we broke the samples into arrestees who reported being at the same risk as other people and those who reported being at lower risk, we found that most of the change has occurred in the percentage of arrestees who believe they are at lower risk. This percentage has dropped steadily from 33% in 1988 to 25% in 1990 ($p<.05$). Hence, fewer injection drug users now consider themselves to be at low risk, but we find no corresponding trend toward greater recognition of the high risk resulting from injection drug use. The statistically significant ($p<.05$) change shown in Figure 3.5 reflects movement from perceived low risk to perceived same risk.

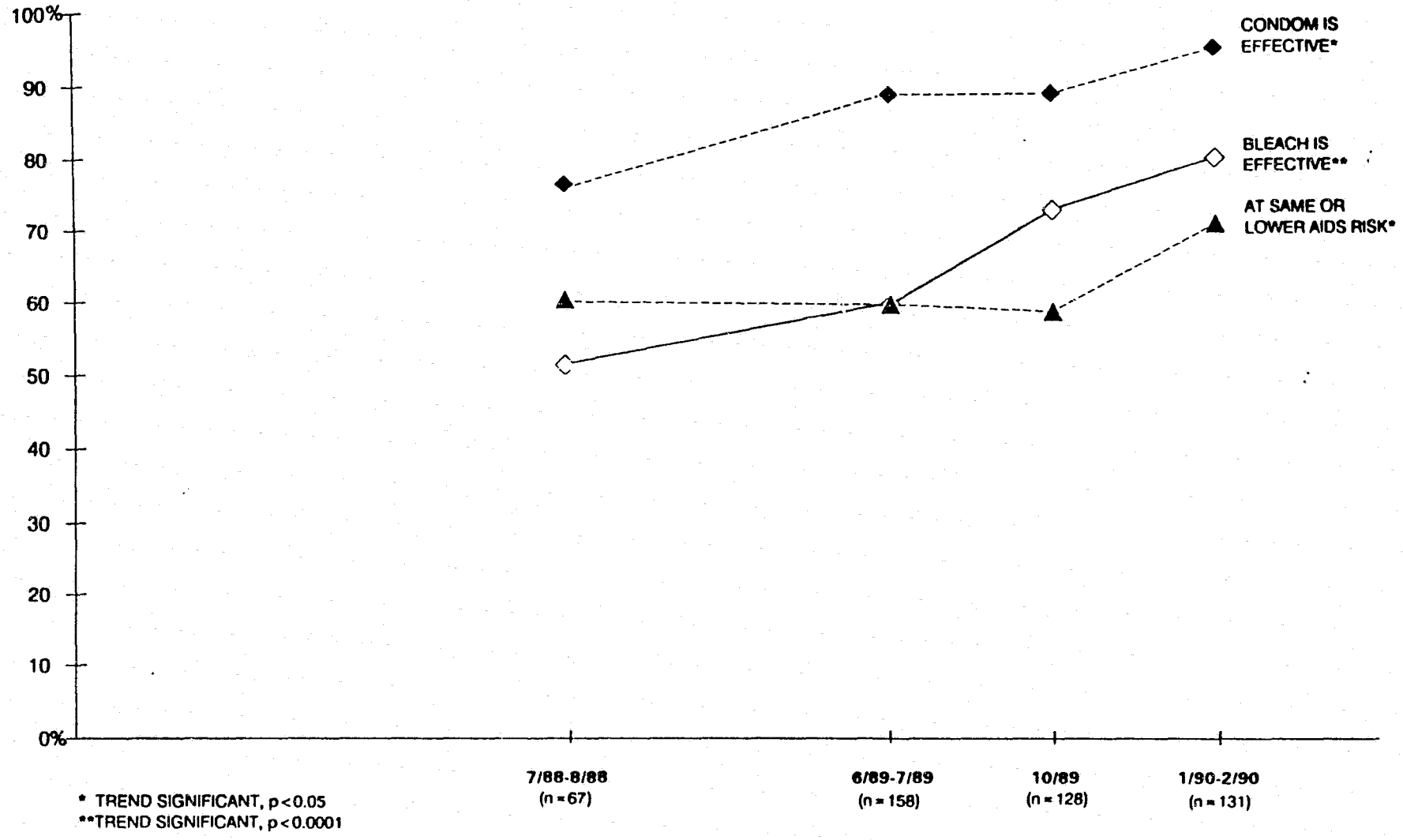
Some DUF arrestees may not be at high risk for AIDS despite their injection drug use if, for example, they never share the injection equipment. We repeated the analysis of risk perceptions for those arrestees who share injection equipment without ever disinfecting it or who have more than one sex partner but never use condoms (n=163). Across all DUF quarters, 63% of these high-risk arrestees said that the possibility of HIV infection is no higher for them than for other people. There was no significant change in this percentage over time (data not shown).

Figure 3.4
HIV ANTIBODY TESTING AMONG INJECTION DRUG USERS
LOS ANGELES COUNTY
DRUG USE FORECASTING PROJECT ARRESTEES



* TREND SIGNIFICANT, $p < 0.005$

Figure 3.5
AIDS-RELATED ATTITUDES AMONG INJECTION DRUG USERS
LOS ANGELES COUNTY
DRUG USE FORECASTING PROJECT ARRESTEES



* TREND SIGNIFICANT, $p < 0.05$
**TREND SIGNIFICANT, $p < 0.0001$

These findings make it clear that a majority of injection drug users do not fully acknowledge their risk of AIDS. This is not surprising. Widespread denial of risk has been observed in many studies of the risk that people associate with health problems, environmental or occupational hazards, and natural disasters. First, when "other people" are the object of comparison, most people appraise their risk not in relation to others in general but in relation to peers. Second, people tend to be optimistic even when comparing their own risk to that incurred by peers (Fischhoff, 1989; Kleinman et al., 1990; Weinstein, 1989).

SUMMARY: INJECTION DRUG USERS

When trend data from the Drug Use Forecasting (DUF) Project were examined in combination with cross-sectional data from several other surveys of injection drug users in Los Angeles, we found declining AIDS risk associated with several drug- and sex-related behaviors. Decreases have apparently occurred in the sharing of injection equipment, use of shooting galleries, and equipment sharing with strangers. Among drug users who continue to share injection equipment, bleach use has increased, as has condom use among drug users with multiple sex partners. Declining AIDS risk is also indicated in two attitude measures. Over time, more injection drug users have come to believe that bleach and condoms are effective in preventing HIV infection.

These trends notwithstanding, many injection drug users continue to incur AIDS risk through, for example, sharing injection equipment and failing to use bleach or condoms. Moreover, no increase has occurred in the frequency with which drug injectors abstain from further drug use or enter treatment. No decrease has occurred in the frequency with which drug users have sex while under the influence of alcohol or other drugs, and users who do so regularly appear more likely to incur AIDS risk through sex with multiple partners. In addition, trend data indicate increasing risk due to sex with multiple partners. Finally, despite using drugs or having sex in ways known to transmit HIV, a majority of injection drug users believe that the risk of AIDS is no higher for themselves than for others.

NONINJECTION DRUG USERS

More limited evidence is available on AIDS-related behaviors among three additional categories of drug users: smokers of crack cocaine, high-risk adolescents, and homeless adults. Using DUF and other sources, we can describe sex-related AIDS risks (number of sex partners and condom use) among crack smokers. We have also assembled information on drug- and sex-related AIDS risks in adult and adolescent populations thought to be particularly vulnerable to AIDS.

CRACK SMOKERS

As demonstrated above, unsafe sex frequently occurs under the influence of alcohol or other drugs. This source of AIDS risk may be especially critical among people who are dependent on crack cocaine. It has been reported that heavy crack smokers participate in unsafe sex while under the influence of the drug or in exchange for it (Boyle, 1990; Boyle and Anglin, 1990; Fullilove et al., 1990; Weissman et al., 1990).

Previous use of crack was reported by 48% of DUF arrestees (with or without a history of injection drug use). Crack smokers were more likely to report having two or more

sex partners in the past year than arrestees who never smoked crack (71% and 46% respectively, $p < .0001$). But crack smokers were not less likely than non-crack arrestees to report using condoms (47% and 51%, respectively). No time trends in condom use or number of partners are apparent. Findings did not significantly change when (1) analyses were restricted to crack smokers who were also injection drug users, or (2) the crack-user category was restricted to arrestees reporting crack as their preferred method of cocaine use.

About 30% ($n = 102$) of the injection drug users in the UCLA Follow-up study (total $n = 334$) smoked crack in the past year. Among users who smoked crack ($n = 102$), 66% reported at least two sex partners in the past year, compared to 36% among users who did not smoke crack ($n = 232$) ($p < .0001$). Among drug injectors who smoked crack and had multiple sex partners ($n = 67$), 39% reported using condoms in the past year. Among drug injectors who had multiple partners but did not smoke crack ($n = 84$), 50% reported using condoms (difference not significant, $p = .17$).

As with the findings on alcohol/drug use during sex, findings on crack use would be more informative if we could specify the degree of sex-related risk incurred by crack users while under the influence of crack. Even so, we found that sex with multiple partners is more likely among crack users than among non-crack users. Crack does not necessarily play a causal role in this relationship. But crack use is at least one element in a life-style characterized by relatively high risk of HIV infection. In Section 4 we test crack use and personal background as independent predictors of sex-related AIDS risk.

HOMELESS ADULTS

Findings are available from an intake sample of 519 adults interviewed at county homeless shelters by the Los Angeles Homeless Health Care Project in 1990. About one-third (31%) of the sample had been homeless for at least one year. Among cases reporting a history of injection drug use (32%, $n = 136$), about half (48%) reported sharing injection equipment, and about one-third (35%) reported never disinfecting their injection equipment with bleach. About 43% of the injection drug users with more than one sex partner reported no use of condoms. This small subsample of injection drug users may not accurately reflect risk patterns among all homeless adults. But the findings are roughly in accord with findings from several other studies of injection drug users.

HIGH-RISK ADOLESCENTS

Recent surveys of incarcerated and homeless adolescents have examined AIDS risk associated with drug use and sexual activity. Beginning in 1987, the county Department of Health Services has interviewed random samples of high-risk adolescents held at Juvenile Hall. Data have been reported for 1,045 cases, whose average age is 16.4 years (Baker et al., 1990). Use of illicit drugs has been reported by almost three-fourths (74%) of the youths, injection drug use by 10%, and crack use by 8%. Half (49%) of the injection drug users reported sharing injection equipment. (This finding is based on a subsample of 417 cases, of whom only 42 were injection drug users; see Baker et al., 1989.) Almost all (97%) of the total sample were sexually active. About one-third (35%) had ever used condoms; 21% reported always using condoms. Sex with an injection drug user was reported by 12% of the sample (21% of the girls). Almost half (45%) reported being high at least occasionally on alcohol or other drugs during sex. (This finding is from a subsample of 262 cases; see Morris et al., 1989.) Though only 0.26% of the total sample was seropositive, these high frequencies indicate that

the risk of HIV infection is nonetheless real among incarcerated youth.

In 1987, Robertson et al. (1989) conducted interviews with 93 homeless adolescents found on the streets or at social-service agencies in Hollywood. The sample was restricted to youths who had spent the previous night in a formal shelter, an improvised shelter (such as an abandoned building or car), or the streets. The average age of these cases was 16.1 years; the average duration of homelessness, ten months. Most (77%) reported some use of illicit drugs; 26%, use of injection drugs. Most (92%) of the sample was sexually active, but almost half (46%) reported no condom use. While homeless, 30% had engaged in sexual intercourse for money; 22%, for food or shelter. Some (17%) had engaged in sex with an injection drug user. Combining various risk behaviors into a composite measure, Robertson et al. (1990) found that fully half (51%) of the sample had engaged in at least one AIDS-risk behavior.

In mid 1990 the Drug Use Forecasting (DUF) Project began interviewing adolescent arrestees at Los Angeles detention facilities. Data are available for 162 cases (average age, 15.0 years). Only 2% of those cases reported injection drug use, but 17% had smoked crack at least once.

Childrens Hospital of Los Angeles has conducted two surveys of homeless youths (Pennbridge et al., 1990; Yates et al., 1988). In 1985, interviews were conducted with 110 homeless youths (aged 12 to 24; average age, 17.5 years) who attended the hospital's outpatient clinic. About half of them were living at shelters or on the streets at the time of their interview. Almost all (84%) of these cases reported illicit drug use, and 35% had used drugs by injection. About one-fourth (26%) had engaged in prostitution. More detailed information is available from the 1990 Childrens Hospital survey of 135 males (aged 12 to 24; average age, 20.0 years) recruited at drop-in centers in Hollywood. Again, almost all (94%) of cases had used illicit drugs, and 13% reported having sex with an injection drug user. Among 39% who had used injection drugs themselves, 47% had shared injection equipment. Among the 29% who recently engaged in "survival sex" (i.e., sex in exchange for money, drugs, food, clothes, or shelter), almost half (44%) said they always used condoms during survival sex. However, over half (60%) said they were usually high on alcohol/drugs during survival sex. According to the authors, this last finding suggests that rates of condom use reported in this survey "may be considerably exaggerated" (Pennbridge et al., 1990: 8).

SUMMARY: NONINJECTION DRUG USERS

We found no evidence of time trends in AIDS risk associated with use of crack cocaine. We also found no significant difference in condom use between crack users and non-crack users. However, sex with multiple partners is apparently more prevalent among crack users than among non-crack users. To reiterate, crack may not play a causal role in these relationships. But crack use does appear to be one element in a life-style characterized by relatively high risk of AIDS.

In one study of homeless adults, a small subsample of injection drug users reportedly incurred AIDS risk at rates similar to those found in other drug-user samples. By itself this finding cannot support any definite conclusions regarding AIDS risk among adult injection drug users who are homeless.

In many respects the degree of AIDS risk among homeless and incarcerated adolescents matches the risk among adult injection drug users. High-risk adolescents use condoms occasionally but not consistently, often have sex while under the influence of

alcohol/drugs, and often engage in survival sex. The chance of HIV infection is highest for adolescents who share drugs, or have sex, with adult injection drug users.. In these studies, 10% to 17% of adolescents reported having sex with an adult injection drug user. This figure is a minimum estimate, since many homeless adolescents cannot be expected to know about the drug-use habits of their survival-sex partners. Among homeless youth, 26% to 39% have reported use of injection drugs.

CONCLUSION: AIDS RISK BEHAVIORS AND ATTITUDES

Surveys of Los Angeles drug users indicate declining AIDS risk associated with several relevant behaviors and attitudes. For example, the sharing of injection equipment has decreased. Among drug users who still share injection equipment, bleach use has increased, as has condom use among drug users with multiple sex partners. Declining AIDS risk is also indicated in two attitude measures. A great majority of injection drug users now believe that bleach and condoms are effective in preventing HIV infection.

On the other hand, many drug users continue to incur AIDS risk through, for example, sharing injection equipment and failing to use bleach or condoms. We found no increasing trend in the frequency with which drug injectors abstain from further drug use or enter drug abuse treatment. We did find an increasing trend in the percentage of drug injectors who have sex with multiple partners. We also found that use of non-injection drugs is associated with AIDS risk. Sex with multiple partners is particularly common among adults who smoke crack cocaine and who engage in sex while under the influence of alcohol or other drugs.

Some AIDS-related behaviors appear as common among high-risk adolescents as among adults. Incarcerated and homeless adolescents have reported inconsistent condom use, frequent sex while under the influence of alcohol/drugs, and frequent survival sex. Many homeless adolescents have used injection drugs or had sex with an adult injection drug user.

On the whole, drug users in Los Angeles County have reduced the risk associated with their drug use and sexual patterns. But the risk of HIV infection is still high in many respects. We would therefore describe the degree of risk reduction found among Los Angeles drug users thus far as notable but modest. More detailed conclusions appear in Section 6.

Is it reasonable to have expected greater change or more rapid change in these indicators of risk reduction? Is further risk reduction possible? These questions require the analysis of risk behavior trends in relative terms. That analysis appears in Section 5.

SECTION 4: FACTORS ASSOCIATED WITH AIDS RISK

Most findings presented thus far have been based on univariate analyses of risk behavior reported in each quarter of the Drug Use Forecasting (DUF) Project and in additional cross-sectional studies. A few findings have been based on bivariate analyses, as in the comparison of risk behaviors among DUF arrestees who have and have not smoked crack cocaine.

In this section we report findings from multivariate analyses designed to explore the possibility that AIDS risk might be related to drug-user characteristics such as age, gender, and treatment status. These analyses indicate the degree to which each characteristic is uniquely associated with AIDS risk when all of the other characteristics are taken into account. It is important to note that our purpose is not to test explanatory models of risk behavior or to maximize explained variance. Rather, our purpose is to identify drug-user categories for whom AIDS risk appears especially high, so that preventive education can be targeted efficiently and designed for greater impact.

We have focused on four behaviors indicative of AIDS risk: sharing injection equipment, failure to disinfect injection equipment with bleach, sex with multiple partners, and failure to use condoms during sexual intercourse. Analyses have assessed the degree to which each risk behavior can be predicted on the basis of:

- o demographic traits--gender, age, education, race/ethnicity, sexual orientation, and marital status;
- o drug use patterns--crack use and drug injected more often (heroin or cocaine);
- o sex-related behavior--working as a prostitute, having sex while high on alcohol/drugs, and number of sex partners; and
- o treatment status--prior or current enrollment in a drug abuse treatment program.

SOURCES

Most of the analyses reported here are based on data from the Drug Use Forecasting (DUF) Project. Because a large data base is desirable when testing several predictive factors simultaneously, we combined all quarterly DUF samples into one. (The DUF Project is described in more detail in Appendix 1.) The number of cases varies across analyses; some relevant questions were not asked in each DUF quarter, and some data are missing for a few cases.

DUF analyses are supplemented with findings from the UCLA Follow-up Study (also described in Appendix 1). Findings from this study provide two advantages. First, 48% of Follow-up Study cases available for this analysis were in drug abuse treatment at the time of their interview, compared to only 5% of DUF arrestees. The Follow-up Study can therefore provide a more informative test of the predictive strength of treatment status. Second, comparing DUF findings to Follow-up Study findings serves a more general, confirmatory purpose. Greater confidence can be placed in findings that emerge from both data sets.

METHODS

We have used logistic regression techniques (Afifi and Clark, 1984) to examine the degree to which drug-user characteristics are associated with three of the four risk behaviors covered in this section. These three behaviors are: sharing injection equipment, failure to use bleach, and failure to use condoms. Coding for each behavior is binary. That is, cases were coded 1 if they reported sharing injection equipment in the past year, reported never using bleach to disinfect equipment in the past year, or reported never using condoms in the past year. Otherwise, cases were coded 0. We adopted this coding scheme so that the higher score would indicate higher risk in each analysis.

Drug-user characteristics were coded with the same binary procedure. For example, to test gender as a predictor of risk, we assigned code 1 to women and code 0 to men. Similarly, to test crack use as a predictor of risk, we assigned code 1 to cases who reported a history of smoking crack and code 0 to those reporting no such history. To test race/ethnicity as a predictor, we used Anglos (non-Hispanic whites) as the comparison group, coded 0 in all analyses. Blacks and Hispanics were each coded 1.

In logistic regression, the unique contribution of each predictor is represented by an "adjusted odds ratio." Each group that is coded 0 is automatically assigned an odds ratio of 1.0, against which the ratio for its counterpart (the group coded 1) is compared. Suppose that women (coded 1) are more likely than men (coded 0) to have shared injection equipment in the past year. If this hypothetical association persists after age, race/ethnicity, and other predictors are taken into account, the adjusted odds ratio for women will exceed 1.0. For example, a ratio of 2.49 would mean that women are about 2.5 times more likely to have shared in the past year. If this hypothetical association were reversed, the adjusted odds ratio for women would be a non-negative number less than 1.0. A ratio of 0.49, for example, would mean that women are about half as likely as men to have shared injection equipment. In the tables below, we have indicated the percentage reporting risk behavior in each drug-user group (men versus women, cases smoking crack versus cases not smoking crack, and so on). We have also indicated the adjusted odds ratio for each group--the likelihood of risk behavior in that group after all other predictors are taken into account.

It is important to note that adjusted odds ratios do not necessarily correspond to the simple comparison of risk-behavior percentages. For example, a higher percentage of women, compared to men, might report using condoms. However, it is likely that a high percentage of prostitutes use condoms, and most prostitutes are women, not men. Consequently, after adjusting for prostitution, we might find that the gender difference in condom use becomes weaker or is even reversed. This is exactly what we found in our analysis of condom-use patterns (see below for specific results). Here we only wish to make the general point that risk-behavior percentages reflect differences between groups before any adjustment is made for other predictors of risk. For that reason, adjusted odds ratios shown in the tables below sometimes do not correspond directly to the percentage differences also shown in the tables.

Data available on the fourth AIDS-risk behavior, number of past-year sex partners, provide a continuous (not just a binary) measure of risk. Among DUF arrestees, the number of past-year sex partners ranged from 0 to 960. About two-thirds of arrestees had fewer than five partners, and only 6% reported more than 20. We found a similar pattern in the Follow-up Study. Cases reported as many as 1,280 past-year partners, but only 6% reported more than 20.

Given these highly skewed distributions, linear regression techniques were not

appropriate. Logistic regression would have been an acceptable alternative with the number of sex partners recoded as a binary measure (for example, code 1 for cases reporting two or more partners, and code 0 for those reporting one or no partner). But such recoding would sacrifice the greater analytical precision achieved with a continuous measure. Accordingly we collapsed number of past-year partners into five categories: no partner, only one, two to four, five to 20, and more than 20. The distribution of this five-category measure is roughly normal (bell-shaped) and therefore appropriate for linear regression. The unique contribution of each predictor (either continuous or binary) is represented by a standardized regression coefficient or "beta weight." For example, if age is unrelated to number of sex partners, its beta weight will be approximately 0. If older cases report more partners, the beta weight for age will be positive; if older cases have fewer partners, negative. Stronger positive relationships will approach 1.0; stronger negative relationships, -1.0.

SHARING INJECTION EQUIPMENT

Among 260 DUF arrestees who reported using injection drugs in the year preceding their interview, 207 reported sharing injection equipment during that time, while 53 did not. Findings from the multivariate analysis of sharing appear in Table 4.1. Some of the odds ratios are well above or below 1.0, but confidence intervals are wide. For example, the adjusted odds ratio for women is 1.60, suggesting that women may be more likely to have shared injection equipment. But the confidence interval around this ratio ranges from 0.78 to 3.28. We therefore cannot conclude that the adjusted odds ratio is actually different from 1.0. For one of the predictors, current treatment, we cannot calculate a meaningful odds ratio because there is no variability in sharing; all 13 arrestees in treatment at the time of their DUF interview reported sharing injection equipment during the previous year. We re-ran this analysis to compare arrestees reporting prior treatment experience (n = 140) to those reporting none. The comparison is a weak test of treatment status because the prior experience of many arrestees may not have been recent. In any case, prior treatment experience does not differentiate sharers and nonsharers (results not shown). Thus, none of the predictors tested here differentiates arrestees who shared injection equipment in the past year from those who did not.

Findings from the Follow-up Study appear in Table 4.2. Compared to DUF, this study includes many more cases who were enrolled in drug abuse treatment at the time of their interview (48% compared to only 5%). The Follow-up Study can therefore provide a more informative test of treatment status. Among Follow-up cases who used injection drugs in the past year, 149 reported sharing injection equipment and 59 did not. The analysis indicated that treatment status is independently associated with sharing. After other predictors are taken into account, sharing is about half as likely (adjusted odds ratio = 0.50) among active drug users currently in treatment as among those not in treatment ($p < .05$). No other Follow-up Study predictors differentiate sharers from nonsharers. The odds ratio for drug preference (adjusted odds ratio = 3.19) indicates that cases who use cocaine more than opiates might be more likely to share. But only 18 cases reported a preference for cocaine. (Most Follow-up cases were originally recruited in methadone clinics, so it is not surprising that opiates would be the preferred drug among most cases in this study.) With so few cases preferring cocaine, the confidence interval is too wide to support a clear finding that the odds ratio for cocaine preference exceeds 1.0.

TABLE 4.1: INJECTION EQUIPMENT SHARING
(DRUG USE FORECASTING PROJECT)

Predictor	Predictor category	Number	Percent sharing	Adjusted odds ratio (95% CI)
Gender	Male	171	76.6%	1.0
	Female	89	85.4	1.60 (0.78,3.28)
Race	Anglo	96	81.3	1.0
	Black	61	75.4	0.83 (0.36,1.90)
	Hispanic	103	80.6	1.05 (0.51,2.18)
Age	Under 36	176	80.7	1.0
	36 or older	84	77.4	0.89 (0.44,1.78)
Years of education	Under 12	113	80.5	1.0
	12 or more	147	78.9	1.05 (0.55,1.99)
Drug injected more often	Opiates	210	79.5	1.0
	Cocaine	50	80.0	1.0 (0.46,2.21)
Current Treatment	No	247	78.5	1.0
	Yes	13	100.0	Not reported[a]

n = 260; Hosmer-Lemeshow chi square = 6.03, p = .65

[a]No variability in sharing among arrestees currently in treatment

TABLE 4.2: INJECTION EQUIPMENT SHARING
(UCLA FOLLOW-UP STUDY)

Predictor	Predictor category	Number	Percent sharing	Adjusted odds ratio (95% CI)
Gender	Male	98	71.4%	1.0
	Female	110	71.8	0.94 (0.50,1.78)
Race	Anglo	87	71.3	1.0
	Black	51	66.7	0.96 (0.43,2.14)
	Hispanic	70	75.7	1.27 (0.59,2.71)
Age	Under 36	71	78.9	1.0
	36 or older	137	67.9	0.63 (0.30,1.30)
Years of education	Under 12	96	74.0	1.0
	12 or more	112	69.6	0.98 (0.50,1.87)
Drug injected more often	Opiates	190	70.0	1.0
	Cocaine	18	88.9	3.19 (0.68,14.9)
Current Treatment	No	109	78.9	1.0
	Yes	99	63.6	0.50[a] (0.27,0.95)

n = 208; Hosmer-Lemeshow chi square = 8.45, p = .39

[a] $p < .05$

DISINFECTION WITH BLEACH

Bleach use in the past year is not relevant to AIDS risk reduction if drug users did not share injection equipment in the past year. Hence, analyses were restricted to drug users who reported sharing injection equipment in the past year. Failure to use bleach was coded 1; any use of bleach, 0. Thus, higher odds ratios indicate higher risk.

Complete data were available for 207 DUF arrestees who shared injection equipment in the past year. Of these, 79 reported using bleach to disinfect injection equipment and 128 did not. Findings appear in Table 4.3. Failure to use bleach is not independently associated with any of the predictors we tested. However, cases who believe that bleach is effective in preventing HIV infection may be more likely to have used bleach for that purpose; though the upper limit for its confidence interval exceeds 1.0, the adjusted odds ratio (0.44) approaches statistical significance ($p = .08$). As in the analysis of sharing, few arrestees were enrolled in treatment when interviewed. We repeated the analysis using prior treatment instead of current treatment as the predictor, but findings did not change for treatment status or any other predictor.

Among 149 cases available for analysis in the Follow-up Study, 95 of those who shared injection equipment in the past year reported using bleach, while 54 did not. Analyses summarized in Table 4.4 indicate that failure to use bleach is less likely among women (odds ratio = 0.47; $p = .05$) and among cases who believe that bleach is an effective means of preventing HIV infection (odds ratio = 0.36; $p = .05$). Notably, failure to use bleach is not independently associated with treatment status.

To summarize the results on drug-related AIDS risks, the Follow-up Study indicated that drug users currently in treatment are less likely to share injection equipment than users not in treatment. This result is consistent with other studies (Abdul-Quader et al., 1987; Ball et al., 1988). Though DUF did not indicate any relationship between treatment status and AIDS risk, we believe that the Follow-up Study is more informative because so few DUF arrestees were enrolled in treatment.

Two other predictors, gender and perceived efficacy of bleach, are associated with failure to use bleach in the Follow-up. Women are more likely than men to have reported using bleach, as are people who believe that bleach is an effective HIV disinfectant. These two Follow-up results were not confirmed in DUF, though bleach use is marginally more likely among DUF arrestees who said that bleach is an effective HIV disinfectant. Finally, DUF results suggested that sharing might be more likely among drug injectors who prefer cocaine to opiates, but this possibility was not confirmed in the Follow-up study.

NUMBER OF SEX PARTNERS

Among DUF arrestees (see Table 4.5), the reported number of sex partners in the past year is greater among arrestees who work as prostitutes (beta = 0.42; $p < .0001$) and among those who are regularly (always or almost always) high on alcohol or drugs during sex (beta = 0.21; $p < .0001$). Fewer partners are reported by older arrestees (beta = -0.14; $p < .01$) and by those who are married or living with a primary sex partner (beta = -0.11; $p < .01$). Independent of these predictors, blacks report having more sex partners (beta = 0.10; $p < .05$). This may also be true of crack users (beta = 0.08), though the statistical significance of this finding is marginal ($p = .08$).

TABLE 4.3: FAILURE TO USE BLEACH
(DRUG USE FORECASTING PROJECT)

Predictor	Predictor category	Number	Percent not using bleach	Adjusted odds ratio (95% CI)
Gender	Male	131	64.9%	1.0
	Female	76	56.6	0.66 (0.35,1.23)
Race	Anglo	78	55.1	1.0
	Black	46	60.9	1.29 (0.58,2.87)
	Hispanic	83	68.7	1.77 (0.91,3.43)
Age	Under 36	142	62.7	1.0
	36 or older	65	60.0	0.73 (0.37,1.44)
Years of education	Under 12	91	61.5	1.0
	12 or more	116	62.1	1.07 (0.59,1.93)
Drug injected more often	Opiates	167	62.2	1.0
	Cocaine	40	60.0	0.84 (0.41,1.75)
Current Treatment	No	194	61.3	1.0
	Yes	13	69.2	2.11 (0.59,7.51)
Perceived bleach efficacy	No	30	76.7	1.0
	Yes	177	59.3	0.44[a] (0.18,1.09)

n = 207; Hosmer-Lemeshow chi square = 8.34, p = .40

[a] p = .08

TABLE 4.4: FAILURE TO USE BLEACH
(UCLA FOLLOW-UP STUDY)

Predictor	Predictor category	Number	Percent not using bleach	Adjusted odds ratio (95% CI)
Gender	Male	70	44.3%	1.0
	Female	79	29.1	0.47[a] (0.23,0.97)
Race	Anglo	62	32.3	1.0
	Black	34	32.4	1.06 (0.39,2.89)
	Hispanic	53	43.4	1.43 (0.62,3.29)
Age	Under 36	56	33.9	1.0
	36 or older	93	37.6	1.16 (0.52,2.56)
Years of education	Under 12	71	45.1	1.0
	12 or more	78	28.2	0.54 (0.25,1.17)
Drug injected more often	Opiates	133	34.6	1.0
	Cocaine	16	50.0	1.50 (0.48,4.68)
Current Treatment	No	86	36.1	1.0
	Yes	63	36.5	1.61 (0.55,2.44)
Perceived bleach efficacy	No	22	59.1	1.0
	Yes	127	32.3	0.36[a] (0.13,0.98)

n = 149; Hosmer-Lemeshow chi square = 10.49, p = .23

[a]p = .05

TABLE 4.5: NUMBER OF SEX PARTNERS
(DRUG USE FORECASTING PROJECT)

Predictor	Standardized regression coefficient
Gender (men = 0, women = 1)	-0.05
Race/black (Anglo = 0, black = 1)	0.10[b]
Race/Hispanic (Anglo = 0, Hispanic = 1)	-0.05
Age	-0.14[c]
Education	-0.03
Crack use (0 = no, 1 = yes)	0.08[a]
Prostitution (0 = no, 1 = yes)	0.42[d]
Sexual orientation (gay/bisexual male = 1; else = 0)	0.04
Living arrangement (single = 0, married/living together = 1)	-0.11[c]
High during sex (never/seldom = 0, always/almost always = 1)	0.21[d]

$n = 409$, $F = 19.17$, $R^2 = 0.33$

[a] $p = .08$ [b] $p < .05$ [c] $p < .01$ [d] $p < .0001$

Findings from the Follow-up Study appear in Table 4.6. Consistent with the DUF results, the number of past-year sex partners is greater among cases who engaged in prostitution (beta = 0.52; $p < .001$), among cases who are regularly high on alcohol/drugs during sex (beta = 0.12; $p < .05$), and among cases who have smoked crack (beta = .11; $p < .05$). Also consistent with DUF results, the number of past-year sex partners is lower among cases who are married or living with a primary sex partner (beta = -0.21; $p < .001$) and among cases who are older (beta = -0.10, $p = 0.05$). Unlike DUF, the Follow-up Study does not indicate that blacks have more sex partners than other racial/ethnic groups but does indicate that women have fewer partners than men (beta = -0.19; $p < .001$).

We examined this last finding in some detail because bivariate analyses indicated that women have more sex partners, not fewer. However, when cases who engaged in prostitution are excluded, the relationship reverses itself. This reversed relationship conforms to the results of our multivariate analysis: after prostitution and other predictors are taken into account, men report more sex partners. Here, then, is a clear example of the value of a multivariate analysis. By testing several drug-user characteristics at once, we are able to specify more precisely the relationships between each of those characteristics and the risk of AIDS.

CONDOM USE

Analyses of our second sex-related risk indicator, condom use, were restricted to cases who reported more than one sex partner in the past year. Failure to use condoms during vaginal or anal intercourse during the past year was coded 1; any condom use, 0. Thus, higher odds ratios indicate greater risk.

DUF findings are reported in Table 4.7. There are 410 cases available for analysis, 139 of whom reported no use of condoms in the past year. AIDS risk (no use of condoms) is more likely among DUF arrestees who have smoked crack (adjusted odds ratio = 0.47; $p < .05$) and those who work as prostitutes (adjusted odds ratio = 0.26; $p < .001$). This source of AIDS risk is less likely among arrestees who have multiple sex partners (adjusted odds ratio = 0.32; $p < .001$) and marginally less likely among people who reported that condoms are effective in AIDS prevention (adjusted odds ratio = 0.65, $p = .10$). Finally, this source of AIDS risk appears more likely among gay/bisexual male arrestees (adjusted odds ratio = 13.91; $p < .05$) and marginally more likely among arrestees who completed high school (adjusted odds ratio = 1.56; $p = .08$).

In the Follow-up Study, 283 cases with multiple sex partners are available for analysis, of whom 161 did not use condoms in the past year. As reported in Table 4.8, risk (no use of condoms) is less likely among injection drug users engaged in prostitution (adjusted odds ratio = 0.09; $p < .0001$) and marginally more likely among cases who are married or living with a primary sex partner (adjusted odds ratio = 1.74, $p = .08$). These two findings are consistent with DUF findings. Risk is less likely among Follow-up cases who completed high school (adjusted odds ratio = 0.53; $p < .05$)--a reversal of the DUF finding for education. Three additional DUF findings were not confirmed. The Follow-up results indicated no association between condom use and sexual orientation, perceived condom efficacy, or crack use. With more gay/bisexual men in the Follow-up (43 cases, compared to 12 in DUF), we place more confidence in Follow-up findings on sexual orientation. (The greater number of gay/bisexual men in the Follow-up is easily explained; sampling was stratified by sexual orientation.) On the other hand, we place more confidence in DUF findings on perceived condom efficacy because the Follow-up comparison is based on only nine cases who did not think condoms are effective.

TABLE 4.6: NUMBER OF SEX PARTNERS
(UCLA FOLLOW-UP STUDY)

Predictor	Standardized regression coefficient
Gender (men = 0, women = 1)	-0.19[c]
Race/black (Anglo = 0, black = 1)	0.06
Race/Hispanic (Anglo = 0, Hispanic = 1)	-0.01
Age	-0.10[a]
Education	0.04
Crack use (0 = no, 1 = yes)	0.11[b]
Prostitution (0 = no, 1 = yes)	0.52[c]
Sexual orientation (gay/bisexual male = 1; else = 0)	0.03
Living arrangement (single = 0, married/living together = 1)	-0.21[c]
High during sex (never/seldom = 0, always/almost always = 1)	0.12[b]

$n = 283$, $F = 22.20$, $R^2 = 0.45$[c]

[a]$p = .05$ [b]$p < .05$ [c]$p < .001$

TABLE 4.7: FAILURE TO USE CONDOMS (DRUG USE FORECASTING PROJECT)

Predictor	Predictor category	Number	Percent not using condoms	Adjusted odds ratio (95% CI)
Gender	Male	257	74.6%	1.0
	Female	153	54.9	0.66 (0.33,1.15)
Race	Anglo	142	61.5	1.0
	Black	135	61.5	1.08 (0.60,1.93)
	Hispanic	131	74.7	1.49 (0.82,2.71)
Age	Under 36	287	65.5	1.0
	36 or older	123	67.5	0.80 (0.46,1.37)
Years of education	Under 12	179	61.5	1.0
	12 or more	231	69.7	1.56[a] (0.96,2.54)
Crack use	No	125	79.2	1.0
	Yes	285	60.4	0.47[b] (0.27,0.82)
Worked as prostitute	No	319	74.9	1.0
	Yes	91	35.2	0.26[c] (0.14,0.48)
Gay or bisexual male	No	398	65.3	1.0
	Yes	12	91.7	13.91[b] (1.66,117)
Married or living with partner	No	295	64.8	1.0
	Yes	115	69.6	0.94 (0.54,1.63)
Regularly high during sex	No	192	67.7	1.0
	Yes	218	64.7	1.30 (0.81,2.20)
Multiple sex partners	No	119	84.9	1.0
	Yes	281	58.4	0.32[c] (0.17,0.60)
Perceived condom efficacy	No	138	69.6	1.0
	Yes	272	64.3	0.65[a] (0.39,1.07)

n = 410; Hosmer-Lemeshow chi square = 9.67, p = .29

[a] $p \leq .10$ [b] $p < .05$ [c] $p < .001$

TABLE 4.8: FAILURE TO USE CONDOMS (UCLA FOLLOW-UP STUDY)

Predictor	Predictor category	Number	Percent not using condoms	Adjusted odds ratio (95% CI)
Gender	Male	134	61.9%	1.0
	Female	149	54.4	1.25 (0.64,2.45)
Race	Anglo	106	50.0	1.0
	Black	76	60.5	1.52 (0.75,3.07)
	Hispanic	101	64.4	1.60 (0.84,3.05)
Age	Under 36	120	52.5	1.0
	36 or older	163	62.0	1.41 (0.80,2.49)
Years of education	Under 12	121	66.1	1.0
	12 or more	162	51.9	0.53[b] (0.30,0.94)
Crack use	No	187	61.5	1.0
	Yes	96	51.0	1.06 (0.56,2.00)
Worked as prostitute	No	238	66.0	1.0
	Yes	45	15.6	0.09[c] (0.03,0.26)
Gay bisexual male	No	240	57.9	1.0
	Yes	43	58.1	1.16 (0.52, 2.60)
Married or living with partner	No	164	49.4	1.0
	Yes	119	69.8	1.74[a] (0.97,3.13)
Regularly high during sex	No	196	60.2	1.0
	Yes	87	52.9	1.37 (0.72,2.61)
Multiple sex partners	No	132	72.0	1.0
	Yes	151	45.7	0.66 (0.35,1.22)
Perceived condom efficacy	No	9	77.8	1.0
	Yes	274	57.3	0.32 (0.05,2.21)

n = 283; Hosmer-Lemeshow chi square = 6.15, p = .63

[a] p = .08 [b] p < .05 [c] p < .0001

Note that failure to use condoms was reported by a higher percentage of men (61.9%) than of women (54.4%). This difference is not statistically significant ($p = .33$). But the gender ranking is reversed in the adjusted odds ratio (1.25). Additional analyses indicated that this reversal can be explained by prostitution. Very few prostitutes (15.6%) reported no use of condoms in the past year. Since most prostitutes (91% in the Follow-up Study) are women, adjusting for past-year prostitution has a major impact on the comparison of risk by gender.

SUMMARY OF CHARACTERISTICS ASSOCIATED WITH AIDS RISK

Unlike drug-related risk indicators, sex-related indicators are associated with several characteristics of injection drug users. Not surprisingly, both DUF and the Follow-up found that drug users who work as prostitutes have more sex partners. But prostitutes are apparently making some effort to manage their risk; both studies indicated that drug-using prostitutes are more likely to use condoms. In other results from both studies, sex with multiple partners is more likely among drug users who do not live with a spouse or primary sex partner, drug users who are younger, those who report regularly being high on alcohol/drugs during sex, and those who have smoked crack.

These last two findings confirm and extend findings reported in Section 3 regarding the bivariate relationships between (a) crack use and number of partners, and (b) sex while high and number of partners. After the adjustment for age, marital status, gender, and other background characteristics, drug users who have smoked crack or who are usually high during sex still have more sex partners. Thus it appears that being high during sex and smoking crack are more than just elements of life-style that is already risky. Multivariate analyses suggest that each factor may represent an additional, independent source of AIDS risk for injection drug users.

We place less confidence in results found in only one study but not both. Nevertheless, one such result is noteworthy. In Section 3, bivariate analyses indicated that condom use is neither more nor less likely among DUF arrestees who have smoked crack than among those who have not. Multivariate analyses of the same DUF data indicated that, after other background characteristics are accounted for, crack smokers are in fact more likely to use condoms. Since no such result appeared in the Follow-up data, the DUF result may be a sampling fluke. Moreover, the DUF finding is not specific as to the circumstances under which condoms are used; crack smokers may use condoms more often overall, but not on occasions when they are smoking crack. Despite the interpretive limits, these multivariate findings call into question the popular image of crack users as indiscriminate or fatalistic risk takers. Though clearly at risk for HIV infection, crack smokers are not necessarily heedless of that fact or unwilling to reduce their risk. It therefore seems reasonable to assume that many crack smokers would be receptive to specially targeted AIDS education. This conclusion and others are discussed further in Section 6.

SECTION 5: AIDS RISK IN SAN FRANCISCO AND LOS ANGELES

Findings in Section 3 indicate that risk reduction among Los Angeles drug users has been notable but modest. We re-examine these findings in Section 5 by asking whether AIDS risk among injection drug users in Los Angeles has declined as extensively or rapidly as might have been hoped. This question is explored by comparing risk-behavior trends in San Francisco and Los Angeles. We first describe strategies for AIDS outreach programs targeted to drug users in these two cities, noting in particular a difference in local policies regarding bleach distribution. We then examine trends in two behaviors for which comparable data are available: the sharing of injection equipment and (among sharers) disinfection of that equipment with bleach.

OUTREACH STRATEGIES

San Francisco is the only California city reporting drug-user seroprevalence rates higher than those found in Los Angeles. The earliest reports from San Francisco appeared in 1986, when HIV infection rates ranged from 6% to 9% (Watters, 1989). By 1987, infection apparently doubled, reaching 13%. Later reports indicate that seroprevalence has leveled off between 12% and 15% (Watters et al., 1990; Yano et al., 1990).

The stabilizing HIV infection rate in San Francisco has been attributed in large part to outreach conducted by community-based organizations in neighborhoods with a high prevalence of injection drug use (Margolis et al., 1990; Watters, 1987; Watters et al., 1988b). Those neighborhoods include, for example, the Tenderloin, Haight-Ashbury, and Bayview-Hunter's Point. Since 1987, outreach workers have circulated on the streets, offering verbal and printed information on how HIV is transmitted and how infection risks can be reduced. Use of bleach to disinfect injection equipment has been actively promoted by distributing one-ounce bottles of bleach along with specific, illustrated instructions on the proper techniques for use. Personal outreach has been supplemented by mass-media AIDS prevention campaigns. Among these campaigns is one featuring Bleachman, a giant superhero whose head resembles a gallon jug of bleach. In billboard advertisements and brochures, Bleachman strongly recommends disinfecting injection equipment and demonstrates how to do it (Chaisson et al., 1987a; Newmeyer, 1988; U.S. General Accounting Office, 1988).

Community-based organizations have mounted outreach efforts in Los Angeles as well. With funding from Los Angeles County, five organizations conduct street-based AIDS education in some areas of high drug-use prevalence. These organizations include El Centro Human Services Corporation in east and northeast Los Angeles; El Proyecto del Barrio in the San Fernando Valley; the Los Angeles Center for Alcohol and Drug Abuse in downtown's skid row area, Lynwood/Compton, and the San Gabriel Valley; Joint Efforts in the South Bay area; and the Watts Health Foundation in south central Los Angeles (Webb et al., 1990). The AIDS Research & Education Project in Long Beach is also targeted to drug users not in treatment. Participants are offered HIV antibody testing and briefly counseled regarding risk reduction. Randomly selected participants receive more intensive and repeated counseling. The UCLA AIDS Nursing Network and the Women and AIDS Risk Network are conducting AIDS education for women recruited at homeless shelters, drug abuse treatment clinics, health clinics, and other social service agencies. Once these women are enrolled, risk-reduction information and support are provided through individual and small-group counseling. Several other outreach, information, and counseling programs are underway in Los Angeles County (see California State Department of Health Services, 1989b). Some are targeted to prostitutes,

jail/prison inmates, homeless adults, and others who may be using illicit drugs.

In these outreach programs, contacts are advised to eliminate drug use if possible and to stop sharing injection equipment or to disinfect it between uses. Only a few programs take the additional step of providing one-ounce bottles of bleach and instruction in proper disinfection techniques. In October 1990, the Los Angeles City Council officially approved a policy statement favoring the distribution of bleach to injection drug users (City of Los Angeles, 1990), and three City-funded projects now distribute bleach in some parts of Los Angeles. But the City has not funded any large-scale effort specifically to promote bleach use. Moreover, under policy set by a majority of the Los Angeles County Board of Supervisors, outreach programs funded by the County emphasize abstinence from drug use. No County-funded outreach program is permitted to distribute bleach samples. Thus, no personal outreach program in Los Angeles is actively promoting use of bleach in the overall drug user population, and Los Angeles has no mass-media campaign designed to encourage the use of bleach.

In summary, organizations in San Francisco have adopted a strategy of active street-based outreach, through which specific techniques for AIDS risk reduction are explained and reinforced. Prominent in this strategy is an aggressive campaign to promote the use of bleach. Several organizations in specific areas of Los Angeles are conducting programs like those in San Francisco, with at least one notable exception: bleach use is not actively promoted.

COMPARISON OF AIDS RISK

Despite the lack of organized bleach promotion in Los Angeles, risk-behavior studies reviewed in Section 3 indicate that bleach use has become more widespread among Los Angeles injection drug users. The Drug Use Forecasting (DUF) Project found that 24% of drug users who shared injection equipment in 1988 also reported disinfecting it with bleach on at least some occasions. That percentage rose to 42% in early 1990. DUF also found reduced sharing of injection equipment. The percentage of drug users who reported sharing dropped from 92% in 1988 to 75% in 1990.

Read conversely, the DUF findings indicate that most Los Angeles drug users still share injection equipment and that most equipment sharers never disinfect with bleach. Has AIDS risk nonetheless declined as widely and rapidly as could have expected? Would an aggressive campaign of bleach promotion augment the trends already observed? Answering these questions requires an assessment of Los Angeles trends relative to trends seen elsewhere.

San Francisco provides a base for comparison. As noted above, San Francisco is the only California city in which drug-user seroprevalence rates appear higher than in Los Angeles. Moreover, to our knowledge San Francisco is the only other California city in which periodic surveys have been conducted to monitor risk-behavior trends in the overall injection drug-user population. We reviewed the San Francisco surveys to see whether trend data on any relevant risk-behaviors might be comparable between cities.

An exhaustive list of San Francisco surveys was assembled through bibliographic searches, personal contacts, and a review of papers presented at the 1989 and 1990 International Conferences on AIDS. We did not find any survey targeted to injection drug users in both cities simultaneously and conducted under exactly the same procedures. But we did find a report by Watters et al. (1990), describing San Francisco trends from early 1986 to mid 1989. Watters et al. recruited their sample of injection drug users from three methadone detoxification centers and three on-the-street locations in San Francisco. Interviewing occurred

in six waves: one in 1986, two in 1987, another two in 1988, and one in 1989. The per-wave sample size averaged 352, for a total of 2,114 across all waves. Two of the survey items are directly comparable to the Los Angeles DUF data. Those items are: percentage who shared injection equipment during the past year, and percentage who used bleach during the past year to disinfect injection equipment.

SAMPLE CHARACTERISTICS

Before examining city trends, we analyzed the data available on the background characteristics of both samples to identify any differences that could affect the comparability of findings. We found that the San Francisco sample closely resembles the overall Los Angeles DUF sample. Table 5.1 provides information on sample characteristics. Men are 64% of the San Francisco sample, 65% of the Los Angeles sample. Blacks are 40% of the San Francisco sample; Hispanics, 15%; non-Hispanic whites, 38%. Los Angeles has almost the same percentage of blacks but a higher percentage of Hispanics and a lower percentage of non-Hispanic whites. Watters et al. excluded men reporting homosexual contact from their data analysis. The Los Angeles sample includes a negligible number (only 2% to 3%) of self-reported gay/bisexual men. Finally, because Watters et al. recruited participants at methadone detoxification clinics, their sample includes a high percentage (52%) in treatment, compared to only 5% in the Los Angeles sample.

For the sake of comparability, men who reported sexual contact with other men can be excluded from the Los Angeles sample. The other two differences--ethnicity and treatment status--are not critical. Racial/ethnic patterns in injection-equipment sharing and bleach use were reported in Watters et al. (1988b; no meaningful differences appear between Hispanics and non-Hispanic whites. (Significantly less sharing was reported by blacks. But each sample includes about the same percentage of blacks, so that difference need not concern us.) Evidence for the similarity of Hispanic and non-Hispanic sharing patterns also appears in a more recent San Francisco sample (Guydish et al., 1990).

Regarding treatment status, we do not believe that short-term methadone detoxification is likely to have had much impact on risk behaviors reported for the entire previous year. Drug users currently in a detoxification program will have been there for, at most, 21 days. Moreover, treatment research quite consistently demonstrates that short-term detoxification by itself does not produce any substantial or lasting change in drug use patterns (Anglin and Hser, 1990). Even so, if we had wanted to focus on a shorter time frame (past week or month), this sample difference might have raised concern. But because risk-behavior reports in both San Francisco and Los Angeles pertain to the previous 365 days, we do not think that the 21-day detoxification experience complicates the analysis. More broadly, the sample comparison would have been problematic if treatment experience of any sort were common in one sample but rare in the other. However, about half of the Los Angeles sample reported prior treatment experience, essentially matching the San Francisco percentage now in treatment. We cannot say that treatment experience is therefore similar in the two samples. But each sample was clearly drawn from populations familiar with drug treatment programs.

FINDINGS

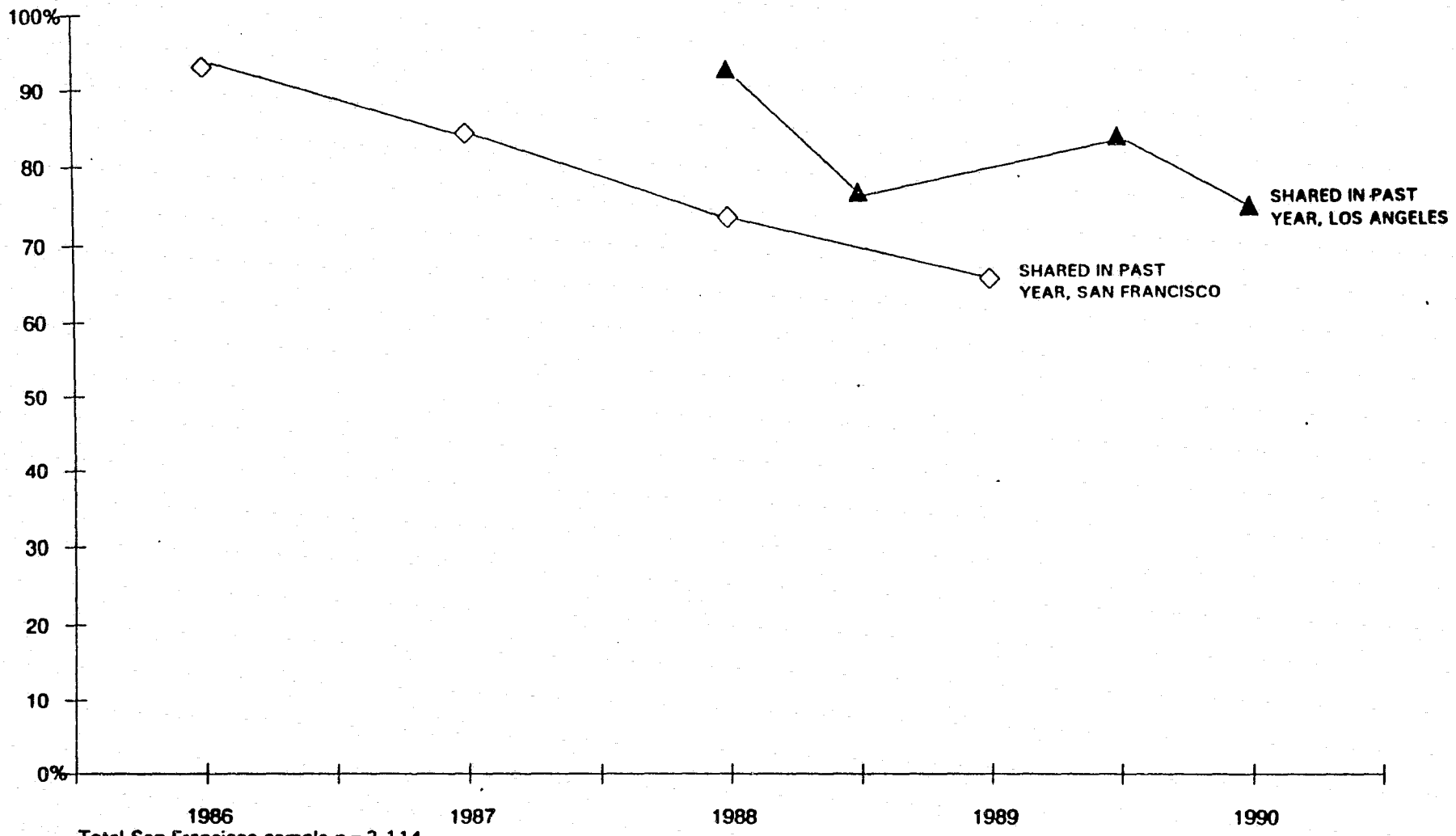
The Los Angeles trend in sharing injection equipment appears in Figure 5.1. Sharing dropped from 92% in 1988 to 74% in 1990. (As noted above, Los Angeles trend data presented in this section exclude male arrestees with same-sex contact.)

TABLE 5.1: SAN FRANCISCO AND LOS ANGELES SAMPLES

	San Francisco	Los Angeles
Men	64%	65%
Women	36	35
Blacks	40	38
Hispanics	15	35
Non-Hispanic whites	38	23
Other ethnic groups	8	2
Gay/bisexual men	0	3
Drug abuse treatment (current)	52	5
Drug abuse treatment (previous)	Not reported	54

Sources: Watters et al. (1990) for San Francisco; Drug Use Forecasting Project for Los Angeles

Figure 5.1
SHARING OF INJECTION EQUIPMENT
LOS ANGELES AND SAN FRANCISCO DRUG USERS



Total San Francisco sample n=2,114
Total Los Angeles sample n=472

In 1986, 91% of San Francisco drug users reported some sharing in the past year. This percentage dropped steadily through 1989, when it reached 65%. Thus, San Francisco and Los Angeles are closely matched both in the high prevalence rate during the initial year of measurement (1986 for San Francisco, 1988 for Los Angeles) and in the trajectory of subsequent decreases. It is likely that some of the risk reduction in each city would probably have occurred in the absence of organized preventive-education programs (see, for example, Friedman et al., 1987a). But as noted above, evidence from San Francisco indicates that some part of the trend in that city, and the earlier onset of that trend, is probably due to organized outreach in which the danger of sharing injection equipment was emphasized (Margolis et al., 1990; Watters, 1987; Watters et al., 1988b). We have no such evidence for Los Angeles, but we do know that outreach programs in Los Angeles have promulgated the same message in similar ways. Given the closely matched sharing trends shown in Figure 5.1, we think it is reasonable to believe that Los Angeles outreach programs have also had an impact.

Bleach use trends present an entirely different picture (see Figure 5.2). In Los Angeles DUF data for 1988, 24% of arrestees reported disinfecting their injection equipment with bleach during the past year. By 1990 this percentage rose to 39%. San Francisco drug users in 1986 reported virtually no use of bleach. But after outreach efforts began in 1987, bleach use rose dramatically to 86% by 1988-89.

As with sharing trends, some of the San Francisco increase in bleach use would probably have occurred in the absence of formal outreach programs. Moreover, there is no conclusive evidence that the difference between cities is due specifically to local policies regarding the promotion of bleach use. In our judgment, though, it is very unlikely that San Francisco drug users would have adopted bleach use so rapidly and extensively if there had been no formal and well-designed campaign to promote bleach. Findings in Watters (1987) and Watters et al. (1988b) support this judgment, as do reports from Jain et al. (1988) and Nassar et al. (1988) regarding bleach promotion efforts in Sacramento.

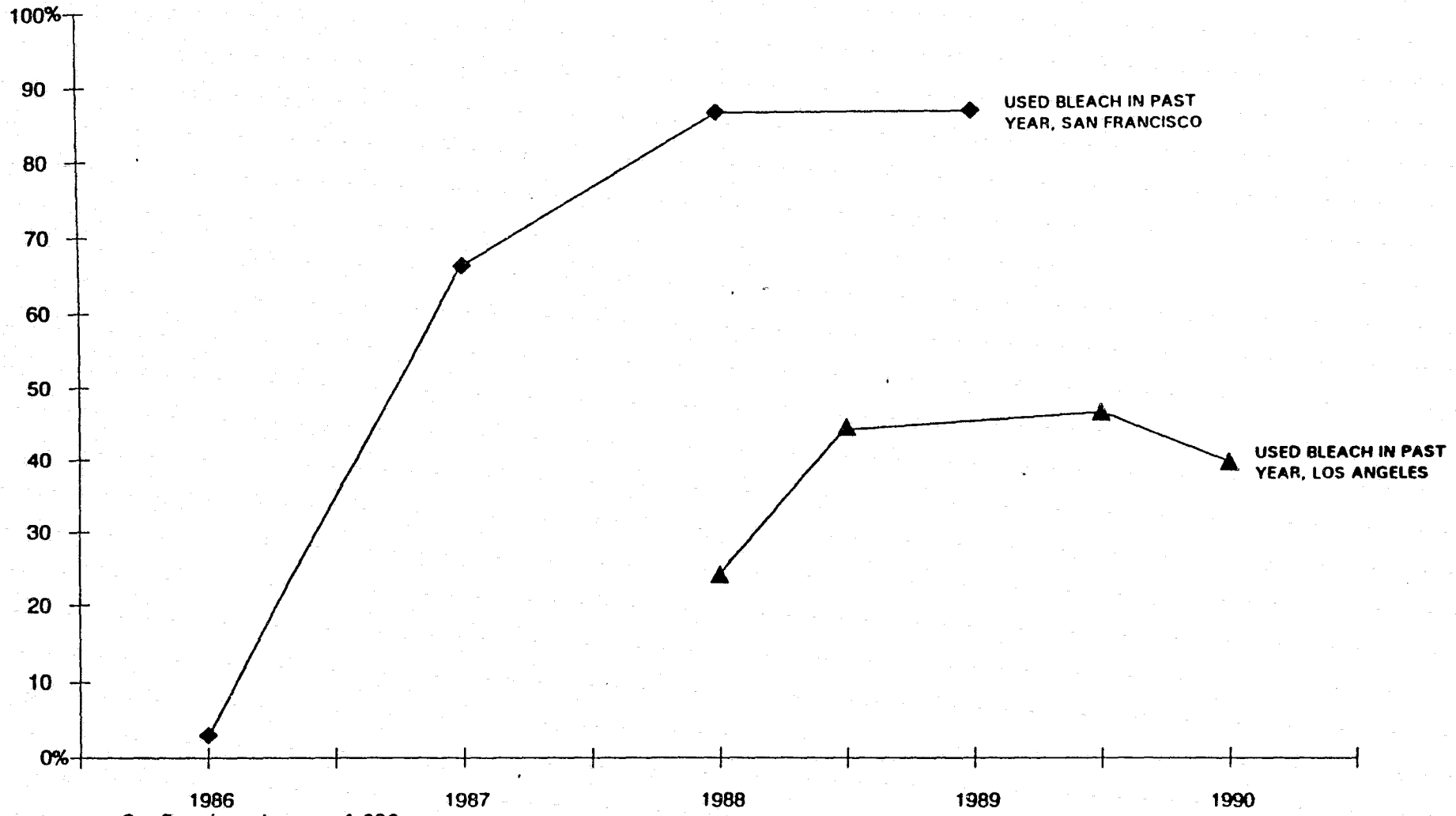
CONCLUSION

In Section 3 we found that risk reduction among Los Angeles drug users has been notable but modest. The additional analyses in Section 5 were intended to provide some basis for relative judgment. Has risk reduction in Los Angeles been as extensive or rapid as could have been hoped?

We identified injection drug-user samples that provide comparable data on risk reduction in Los Angeles and San Francisco. Those data pertain to two AIDS-risk behaviors: injection-equipment sharing and use of bleach. Analyses suggest that the sharing of injection equipment has followed a similar pattern of decline in both cities. Outreach efforts in San Francisco and Los Angeles have promulgated the same message on sharing and used similar strategies. We do not know whether other messages or strategies might have had greater impact, but in the data available we find no indication that reductions in injection-equipment sharing in Los Angeles have been less extensive than might otherwise have been possible.

On the other hand, increases in bleach use have been much more extensive in San Francisco than in Los Angeles. Outreach programs in the two cities have promulgated divergent messages on bleach use. In San Francisco, bleach use is aggressively promoted. In Los Angeles, policy set by a majority of the Board of Supervisors prohibits bleach distribution by any county-funded outreach program, and bleach use is not actively promoted even by programs funded through other sources.

Figure 5.2
BLEACH USE AMONG LOS ANGELES AND SAN FRANCISCO DRUG USERS (SHARERS ONLY)



San Francisco sharer n = 1,686.
Los Angeles sharer n = 373.

We cannot conclude that this policy discrepancy explains all or most of the difference in bleach-use trends. San Francisco's greater increase may be due in some part to differences in unmeasured sample characteristics or differences in the social ecology of drug use within each city. Some of the apparent increase in San Francisco (and in Los Angeles as well) may not even be real. Aggressive bleach promotion could have raised the social desirability of bleach use so effectively that some drug users who do not use bleach nonetheless report that they do, in hopes of avoiding the interviewer's disapproval. However, it is unlikely that the substantial difference in Figure 5.2 can be explained entirely by factors other than bleach-distribution policy.

SECTION 6: CONCLUSIONS

In this final section, we present our conclusions regarding HIV seroprevalence and AIDS risk among Los Angeles drug users. Seroprevalence data from Section 2 are presented separately for injection drug users in treatment and those not in treatment. Conclusions regarding AIDS-risk behaviors and attitudes are summarized from the data presented in Sections 3 to 5.

CONCLUSIONS REGARDING HIV SEROPREVALENCE

TREATMENT-BASED STUDIES

Studies in methadone maintenance/detoxification clinics found seroprevalence rates ranging from 1% to 3%. Because the primary drug of abuse for methadone-treatment clients is opiates, findings suggest that seroprevalence is probably no higher than 3% for injection opiate users who are enrolled in methadone maintenance/detoxification treatment.

This conclusion should be considered tentative for two reasons. First, most studies were based volunteer samples, and refusal rates were often high; as a consequence, volunteer self-selection could have biased the findings in either direction. Second, confidence intervals for these findings are unknown. Combining data across clinics introduces some (unknown) degree of imprecision, and the probability of sample inclusion may not have been equal for all clients at a clinic. While these limitations are noteworthy, we do not find them critical. There is some indication that self-selection bias may not be important. The AIDS Epidemiology Program's blinded studies, not subject to self-selection, found rates (2% to 3%) no higher than those found in other studies. In addition, the low variability in seroprevalence across all studies suggests that confidence intervals may in fact be rather narrow.

NON-TREATMENT STUDIES

Studies of injection drug users in non-treatment locations found seroprevalence rates between 4% and 10%. County-wide studies in this category were based on injection drug users who sought services offered at alternative test sites and sexually transmitted disease (STD) clinics. Another major non-treatment study contacted drug users in public places (e.g., parks and streets) in Long Beach. Rates were highest at the alternative test sites, which exist specifically to provide HIV antibody testing, and among homeless injection drug users who requested testing. It seems likely that these higher rates are due at least partly to volunteer self-selection. Other non-treatment studies found seroprevalence rates between 4% and 8%.

The two limitations cited with respect to treatment-based studies apply to non-treatment studies as well. Most non-treatment studies relied on small, volunteer samples; confidence intervals for rates found in these studies are unknown. However, surveys at county STD clinics were blinded and based on large sample sizes. Those surveys might accordingly be the most reliable existing source of seroprevalence data for drug users not in treatment. Rates found at STD clinics were similar to rates found in other non-treatment studies. We therefore tentatively conclude that seroprevalence is probably no higher than 8% among injection drug users not in treatment.

POSSIBLE INCREASE IN SEROPREVALENCE

Beginning with treatment-based studies in 1988 and non-treatment studies in 1989, recent trends suggest the possibility of a slight increase in seroprevalence rates. This trend may be due to variability in the degree to which drug users at highest risk are motivated to seek antibody testing. Alternatively the trend may be due to random fluctuations in sampling. On the basis of data available thus far, no conclusion can be drawn regarding seroprevalence trends among injection drug users in Los Angeles.

CONCLUSIONS REGARDING AIDS RISK

INJECTION DRUG USE

Trends in AIDS-related risk were based on the Drug Use Forecasting (DUF) Project and several cross-sectional surveys of drug users in Los Angeles. Multivariate analyses examined the degree to which AIDS risk is associated with background characteristics of drug users. Findings indicated declining levels of AIDS risk in several respects. The sharing of injection equipment has apparently decreased, as has use of drugs at shooting galleries and injection-equipment sharing with strangers. Among drug users who still share injection equipment, bleach use has increased. So has the use of condoms among drug users with multiple sex partners. Declining AIDS risk was also indicated in two attitude measures. Over time, more injection drug users have come to accept the fact that bleach and condoms are effective in avoiding HIV infection. Finally, multivariate analyses found that drug-related AIDS risk was not consistently associated with background factors such as gender, age, race/ethnicity, or education. Further analyses found, however, that drug users whose sex-related risk is high have taken steps to reduce their risk. For example, after other demographic and life-style characteristics were taken into account, drug users who work as prostitutes were significantly more likely to use condoms.

These favorable results aside, many injection drug users continue to incur AIDS risk. Three-fourths of the latest DUF sample (early 1990) reported some sharing of injection equipment during the past year. The trend toward less sharing (specifically, the percentage of drug users who report "no longer sharing") has leveled off since mid 1989, suggesting that this trend may not persist without enhanced preventive efforts. Further, about half of those who shared said they did not disinfect their equipment with bleach at any time in the past year, and almost half of those with multiple partners did not use condoms. No trend emerged on additional indicators of AIDS risk. People with a history of injection drug use have not become more likely to abstain from further injection drug use or to enter drug abuse treatment.

There has been no decrease in the percentage reporting sex under the influence of alcohol or other drugs, and there is evidence of increasing AIDS risk from engaging in sex with multiple partners. Despite their self-reported risks, most injection drug users still believe that the risk of AIDS is no higher for them than for other people. Finally, multivariate analyses indicated more sex-related AIDS risk (number of past-year sex partners) among injection drug users who reported being regularly high on alcohol/drugs during sex.

NONINJECTION DRUG USE

In bivariate analyses, number of past-year sex partners was higher among people who have smoked crack than among those who have not. As noted above, number of sex partners

was also higher among drug users regularly high on alcohol/drugs during sex. Both relationships persisted in multivariate analyses, suggesting that crack use and being high during sex may represent independent sources of AIDS risk. On the other hand, neither smoking crack nor being high was independently associated with failure to use condoms. Injection drug users who smoke crack may actually be more likely to use condoms than those who do not smoke crack.

Limited evidence suggested that dangerous drug- and sex-related practices are as common among high-risk adolescents as among adult injection drug users (see also Flora and Thoresen, 1989). Adolescents have reported inconsistent condom use, frequent sex while under the influence of alcohol/drugs, and frequent acts of "survival sex" in exchange for money, food, or shelter. Many homeless adolescents have used injection drugs or had sex with adult injection drug users.

EVALUATION OF FINDINGS

It is important to realize that self-reports of risk behavior may not be completely reliable. As noted in Section 4 with regard to self-reported bleach use, AIDS prevention campaigns may have raised the social desirability of risk reduction so effectively that some drug users who have not reduced their risk nevertheless tell interviewers that they have (Guydish et al., 1990; Miller et al., 1990; Schottenfeld et al., 1989; Watters et al., 1988b). Also, deliberate underreporting may be more common when the recall period for self-reported drug use is more recent (Hser et al., 1990; Miller et al., 1990). Those problems aside, underreporting can also occur accidentally and may be most likely when survey participants are asked to report how frequently a behavior occurred, not just whether it occurred or not (Bradburn et al., 1987; Catania et al., 1990; McLaws et al., 1990).

We therefore assume that AIDS risk is underreported to some degree in these studies, i.e., that the findings provide a minimum estimate of current risk. On the other hand, we have no reason to assume that underreporting has increased or decreased substantially over time. The trends cited above therefore probably reflect actual change. But given the mixed findings overall, risk reduction among Los Angeles drug users thus far is best described as notable but modest.

AIDS RISK AND HIV SEROPREVALENCE

Findings on risk behaviors underscore the possibility that HIV infection among Los Angeles drug users could soon increase, perhaps rapidly. Consider three arguments invoked to explain why seroprevalence has remained so much lower in California than in the northeast United States (see Watters, 1989). First, shooting galleries in New York City are, for the most part, quite unlike those in California cities. Patrons of New York shooting galleries typically pay a small fee (a dollar or two) to rent "house works"--needles and syringes stored in a jar of water. The number of patrons per day can exceed 100. In Los Angeles and San Francisco, shooting galleries are usually apartments or residential hotel rooms visited by relatively few people daily (perhaps 20). There may be one set of house works available, but no jarful to choose from (Des Jarlais et al., 1986; Murphy and Waldorf, 1989; Watters, 1989). While the risk of HIV transmission is certainly real in such places, the risk is presumably much lower than in shooting galleries of the east coast.

Second, injection drug users in California are thought to restrict their use to small self-

contained social networks, while east-coast users more often inject drugs in the company of strangers. This practice compounds the risk of AIDS because strangers in one network may also share in other networks, whose members share in still other networks.

Third, seroprevalence was already high in New York City (perhaps 40%) before the risk of AIDS was widely recognized. However, it is argued that drug users in California were alerted to AIDS, and had time to reduce their risk, before seroprevalence could reach the "critical mass" necessary to trigger an uncontrollable spread of HIV.

We believe that, for the present, these arguments are correct in relative terms. HIV infection risk during the 1980s was clearly much higher in east-coast cities. But this does not mean that HIV infection risk is negligible in west-coast cities or that it will remain so. Seroprevalence could rise in west-coast cities, even rapidly, under certain conditions.

This possibility is quite real because findings cited above indicate persistent HIV infection risk among many Los Angeles drug users. First, while use of shooting galleries appears low and may have decreased, perhaps 15% to 25% of injection drug users in Los Angeles still use shooting galleries.

Second, about 25% continue to share injection equipment with strangers, and there is no clear ongoing trend toward a lower prevalence of this practice. Additional findings indicated that the social networks of many drug users are not fully self-contained. About half of the injection-equipment sharers in the Follow-up Study said their sharing was not confined to members of a single social network. Considerable local geographic mobility is suggested in the finding that about half of the sample sometimes used drugs at locations not near their homes. In short, perhaps half the injection drug users in Los Angeles travel across networks and share across networks at least some of the time.

Third, while west-coast drug users have clearly adjusted their risk behaviors, the notable but modest changes seen in Los Angeles leave room for widespread, continuing AIDS risk. For instance, as already emphasized, several studies converge on the conclusion that 66% to 75% of Los Angeles drug users still share injection equipment and that 43% to 50% never use condoms with casual partners. We do not know whether these rates of risk behavior are high enough to sustain a large or rapid increase in HIV infection. But, as noted in Section 5, we do know that seroprevalence doubled as recently as 1987 in San Francisco even though the risk of AIDS was well known by then.

CLOSING

HIV seroprevalence among injection drug users in Los Angeles is probably no higher than 8%--still very low, compared to rates seen in some east-coast cities. Los Angeles infection rates may already be starting to rise, but this possibility cannot be confirmed or disconfirmed without additional data. In any case, a future and rapid increase in seroprevalence is quite possible. We base this conclusion on two summary observations. First, San Francisco seroprevalence rates doubled (roughly from 6% to 12%) within the span of one year (1986-87) even though the risk of AIDS was widely recognized among drug users by that time. Second, despite notable changes in behavior, many injection drug users in Los Angeles remain at high risk.

APPENDIX 1: DATA SOURCES

To identify possible data sources for this report, we followed a three-step procedure. First, at the beginning of this project, representatives of the Los Angeles County AIDS Program Office and the UCLA Drug Abuse Research Group created an initial list of data sources. The list was based on personal knowledge and a review of AIDS program rosters, such as the 1989-90 directory of state-funded AIDS education and prevention programs (California State Department of Health Services, 1989b) and a list of AIDS demonstration projects funded by the National Institute on Drug Abuse (NOVA Associates, 1989). Second, we sent this list to sources named on it and to others involved in local AIDS research, asking them to identify additional sources. Third, as the project continued, both the AIDS Program Office and the Drug Abuse Research Group continued efforts to identify data sources by, for example, reviewing abstracts from the 1990 International Conference on AIDS and attending multi-agency meetings of local AIDS research projects and service providers.

Ultimately, this three-step procedure generated a list of over 40 studies, cited below. Those already complete are cited first. Sources still collecting or analyzing data as of December 1990 are cited next. Some (see Acknowledgements) provided interim analyses for this report. The last group of studies includes those that have not been in operation long enough to provide useful analyses. We have cited them to facilitate future updates of this report. Regarding studies still in progress, we have also listed study directors and others who can be contacted for further details.

COMPLETED STUDIES

HIV antibody testing in drug abuse treatment clinics (1985). Source: Levy et al. (1986). The study recruited volunteers for antibody testing at "methadone or alternative treatment" clinics in seven California counties. Seroprevalence was 1.7% in a sample of 345, but only 15 cases were from Los Angeles. None of those 15 cases tested positive.

HIV antibody testing and AIDS risk survey among incarcerated prostitutes in Los Angeles (1985). Source: Gill et al. (1986). A sample of 113 female prostitutes received antibody testing and completed a risk behavior survey. A subsample of 56 reported injection drug use. Almost all of them had shared injection equipment. Of the 89 women tested, 6% were seropositive, but injection drug use was not related to serostatus. We did not report this study because (1) data on injection-equipment sharing were apparently based on lifetime, not recent, behavior; (2) no other risk behaviors were reported for the injection drug-use subsample; and (3) the injection drug-use subsample was quite small.

AIDS risk survey among homeless adolescents (1985). Source: Yates et al. (1988). In 1985, Childrens Hospital of Los Angeles interviewed 110 runaway youth (aged 12 to 24) who attended the hospital's outpatient clinic. About half of them were living at shelters or on the streets at the time of their interview. Almost all (84%) of these runaways reported illicit drug use, and 35% had used drugs by injection.

HIV antibody testing in drug abuse treatment clinics (1986). Source: Tennant (1987b). Injection drug users enrolled at 15 clinics operated by Community Health Projects (CHP) received voluntary testing. The sample size was 416. Five of these clinics were located in Los Angeles County. The subsample at these clinics totaled 200.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1986). Source: Mascola et al. (1989). The Los Angeles County Drug Abuse Program Office (DAPO) conducted antibody testing and an extensive interview on AIDS risk among injection drug users enrolled at 31 methadone maintenance/detoxification clinics. The sample size was 728.

AIDS risk survey of injection drug users (1986). Source: Anglin and Brecht (1986). In 1985, UCLA began a survey of injection drug users who had been enrolled in the Civil Addict Program twenty years before. Just over 100 cases had been recontacted and interviewed by early 1986. The survey included four AIDS-related items, none directly comparable to the findings we reported from other surveys.

HIV antibody testing in drug abuse treatment clinics (1987). Source: Tennant (1987a). A sample of 171 injection drug users at CHP clinics received voluntary testing in 1987.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1987). Source: Arnold (1988). Using the same procedures followed in 1986, DAPO repeated its survey in 33 methadone maintenance/detoxification clinics. The sample size was 502.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1987). Source: Anglin and Arnold (1987). DAPO surveyed clients in 19 county residential drug-free clinics. Sample size was 293. Participants received HIV antibody testing/counseling and were interviewed regarding their drug- and sex-related AIDS risk.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1987). Source: Battjes et al. (1990). Since 1987, the National Institute on Drug Abuse (NIDA) has conducted annual non-blinded antibody testing and AIDS risk interviews of clients entering methadone maintenance/detoxification clinics in Los Angeles County. The 1987 cohort included 208 cases.

AIDS risk survey of homeless adolescents (1987). Sources: Robertson (1989). This study conducted interviews with 93 homeless adolescents found on the streets or at social-service agencies in Hollywood. The sample was restricted to youths who had spent the previous night in a formal shelter, an improvised shelter (such as an abandoned building or car), or on the streets. Three-fourths (77%) reported some use of illicit drugs; 26%, use of injection drugs.

HIV antibody testing in drug abuse treatment clinics (1988). Source: Tennant (no date). A sample of 149 injection drug users at CHP clinics received voluntary testing in 1988.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1988). Source: Drug Abuse Program Office (1989). DAPO repeated its earlier surveys of clients in county methadone maintenance/detoxification clinics. The sample size was 508.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1988). Source: Battjes et al. (1990). Under the same procedures followed in 1987, NIDA conducted antibody testing and AIDS risk interviews of 429 methadone maintenance/detoxification clients in Los Angeles County in 1988.

HIV antibody testing and AIDS risk survey of injection drug users (1988). Source: Rhodes et al. (1990a). In 1988, the AIDS Research & Education Project conducted antibody tests and interviews among injection drug users recruited in parks, social service agencies, and other public places. Users currently in treatment were excluded from participation. The

sample size was 325.

AIDS risk survey among drug users (1988). Source: Davis (1988). This survey was conducted by telephone among clients of the Chemical Dependency and Addictive Behaviors Program of AIDS Project Los Angeles. Survey questions focused on clients' history of, and reasons for, illicit drug use. No clients reported injection drug use. The sample was mostly (87%) homosexual. Sample size was not specified.

HIV antibody testing of decedents (1988). Source: Muto (1989). Beginning in April 1988, the Los Angeles County coroner's office conducted HIV antibody testing on 800 blood specimens taken from decedents. In 200 cases, injection drug use was suspected. Five specimens (2.5%) tested positive. Because of complications in the sampling procedure, this study is not cited in the report.

HIV antibody testing and AIDS risk survey in drug abuse treatment clinics (1989). Source: Battjes et al. (1990). Under procedures followed in 1987-88, NIDA continued antibody testing and AIDS risk interviews of methadone maintenance/detoxification clients in Los Angeles County. The 1989 cohort included 261 cases.

AIDS risk survey of injection drug users (1990). Source: Webb et al. (1990). In conjunction with street outreach efforts, staff from five community-based organizations interviewed a convenience (nonrandom) sample of 500 injection drug users not in treatment. Interviews focused on drug- and sex-related AIDS risks.

AIDS risk survey of homeless adolescents (1990). Source: Pennbridge et al. (1990). Childrens Hospital of Los Angeles surveyed 135 males (aged 12 to 24) at drop-in centers for runaway youth in Hollywood. Almost all (94%) of these young men had used illicit drugs, 39% by injection.

HIV antibody testing of pregnant women (1989-90). Source: Finn (1990). This report summarizes data on HIV antibody testing and risk factors among 10,622 pregnant women attending either a county comprehensive health center or one of five county prenatal clinics between February 1989 and February 1990. The number of seropositive cases was 17 (0.2%), too few for useful analysis of risk factors.

HIV antibody testing at sexually transmitted disease clinics (1989). Source: Wenger et al. (1989a). This study evaluated the effect of antibody testing/counseling on sex-related risk and HIV-related communication with sex partners. Subjects were clients at a Los Angeles county sexually transmitted disease clinic (n=256). Data have not been reported on risk factors, so we could not determine behavior patterns or antibody status for injection drug users, if any, in this sample.

HIV antibody testing among college students (1989). Source: Wenger et al. (1989b). Conducted at UCLA, this study evaluated the effect of HIV antibody testing/counseling on sex-related risk and HIV-related communication with sex partners. Subjects were college students (n=435). Data have not been reported on risk factors, but the percentage of injection drug users in this sample is presumably very low (see general population surveys).

AIDS risk survey of the general population (1989). Source: Avance Human Services (Arguelles and Romero, 1989). Under a contract with the Los Angeles County AIDS Program Office, Avance Human Services conducted a telephone survey on AIDS-related issues among minority county residents (n=922). Only 18 (2%) of cases reported injecting illicit drugs

during the previous six months. This number is too low for meaningful analysis.

AIDS risk survey of the general population (1987). Source: California Department of Health Services (raw data files). Communication Technologies conducted a statewide telephone survey on AIDS-risk behavior in 1986-87. The Los Angeles subsample includes 641 cases, of whom five (0.8%) indicated a history of injection drug use. This number is too low for meaningful analysis.

AIDS risk survey of gay/bisexual men (1984-90). Source: raw data reports. Since 1984, the four-city Multicenter AIDS Cohort Study (MACS) has conducted semiannual interviews on drug- and sex-related AIDS risks in cohorts of gay/bisexual men. The Los Angeles MACS cohort includes 1,637 cases. At the first interview, 128 cases (8%) reported some use of injection drugs during the past five years (that is, between 1979 and 1984). But at the second interview, only 13 cases (0.8%) reported injection drug use within the past six months. This number was even lower in subsequent interviews. Thus we have not analyzed AIDS risk among gay/bisexual injection drug users in the Los Angeles MACS.

STUDIES IN PROGRESS: DATA AVAILABLE

AIDS risk survey of incarcerated adults (1987-90). Source: raw data files. Contact: Kiku Annon, UCLA Drug Abuse Research Group, 1100 Glendon Avenue #673, Los Angeles 90024; (213) 825-9057. In 1987 the Drug Use Forecasting (DUF) Project began interviews of incoming adult arrestees held in Los Angeles County jails. Data collection has occurred quarterly. However, DUF was suspended from late 1988 to mid 1989. Data are therefore available for seven nonconsecutive quarters through early 1990. The current sample size is about 3,300 arrestees, of whom 32% (n = 1,056) reported using injection drugs. As DUF proceeded, many AIDS-related items were added to the survey; a few other items were revised. Thus, data on some AIDS-related behaviors are either not available or not comparable across all seven quarters.

AIDS risk survey of incarcerated adolescents (1987-90). Sources: Baker et al. (1989, 1990); Morris et al. (1989). Contact: Charles Baker, Juvenile Court Health Services, 1925 Daly Street, Los Angeles 90031; (213) 226-8723. Beginning in 1987, the county Department of Health Services has interviewed random samples of high-risk adolescents held at Juvenile Hall. Data are available on 1,045 cases, of whom 74% reported using illicit drugs.

HIV antibody testing in drug abuse treatment clinics (1988-90). Sources: Ford (1990), Rose (1989), and raw data reports. Contact: Wes Ford, Los Angeles County AIDS Epidemiology Program, 600 S. Commonwealth Ave., Los Angeles 90005; (213) 351-8202. The Los Angeles County AIDS Epidemiology Program collects seroprevalence data at county methadone maintenance/detoxification clinics. In 1988-90, over 3,700 tests were conducted.

HIV antibody testing in sexually transmitted disease clinics (1988-90). Sources: Los Angeles County AIDS Epidemiology Program (1990b), Ford (1990), Rose (1989), and raw data reports. Contact: Wes Ford, Los Angeles County AIDS Epidemiology Program, 600 S. Commonwealth Ave., Los Angeles 90005; (213) 351-8202. The Los Angeles County AIDS Epidemiology Program collects seroprevalence data through surveys at county sexually transmitted disease clinics. In 1988-90, over 30,000 tests were conducted. About 1,500 (5%) cases reported using injection drugs.

HIV antibody testing among homeless injection drug users (1990). Contact: Wes Ford, Los Angeles County AIDS Epidemiology Program, 600 S. Commonwealth Ave., Los Angeles 90005; (213) 351-8202. In summer 1990, Los Angeles County began offering antibody testing to homeless adults in the downtown area. As of November 1990, 256 cases had reported a history of injection drug use. Of these, 203 requested confidential testing. The other 53 tests were blinded.

HIV antibody testing and AIDS risk survey of injection drug users (1989-90). Source: raw data files. Contact: Douglas Longshore, UCLA Drug Abuse Research Group, 1100 Glendon Avenue #763, Los Angeles 90024; (213) 825-9057. Called the Follow-up Study in the report, this study is recontacting a subsample of cases (n=465) who participated in any of three earlier surveys of injection drug users in treatment. These surveys were conducted in 1986-87 by the Los Angeles County Drug Abuse Program Office (see Anglin and Arnold, 1987; Arnold, 1988; and Mascola et al., 1989). A series of three annual contacts is planned. Cases are asked to report their AIDS-related attitudes and recent AIDS-related behavior. They are also offered HIV antibody testing and counseling. Data are available from the first 360 cases who completed the initial interview in 1989-90. Among 335 cases who were antibody negative at the time of the previous survey, two (0.6%) had seroconverted (become antibody positive) by 1990. Cases who are most difficult to recontact may be at higher AIDS risk from continued use of illicit drugs or other life-style characteristics. We therefore do not consider this interim seroconversion rate to be a reliable indicator of overall seroconversion among Los Angeles injection drug users with drug abuse treatment experience.

HIV antibody testing and AIDS risk survey of injection drug users (1989-90). Sources: Rhodes (1990b) and raw data reports. Contact: Fen Rhodes, AIDS Research & Education Project, California State University, 1250 Bellflower Blvd., Long Beach 90840; (213) 985-7508. In 1989-90, the AIDS Research & Education Project continued its tests and interviews among street-based injection drug users. The sample includes 1,146 cases.

AIDS risk survey of high-risk women (1989-90). Source: raw data provided under National Institute on Drug Abuse contract 271-87-8209. Contact: Vivian Brown, Project WARN, 5601 W. Slauson Avenue #200, Culver City 90230; (213) 641-7795. Operating in three U.S. cities, the Women and AIDS Risk Network (WARN) combines research and education/intervention on AIDS issues relevant to high-risk women. Recruitment occurs in health clinics, drug abuse treatment clinics, jails, and other settings. Women who agree to participate receive individual and small-group counseling on AIDS risk reduction. WARN participants are adolescent and adult prostitutes and sex partners of injection drug users. Data made available for this report were based on 1,488 cases, of whom 299 reported use of injection drugs during the previous six months.

HIV antibody testing and AIDS risk survey of women (1989-90). Source: raw data reports. Contact: Adeline Nyamathi, UCLA School of Nursing, 10833 Le Conte Avenue, Los Angeles 90024; (213) 825-8609. The AIDS Nursing Network provides antibody testing and counseling to black and Hispanic women recruited through homeless shelters, drug abuse treatment clinics, and other agencies. As of October 1990, the sample included 978 cases, of whom 115 reported use of injection drugs within the past six months.

AIDS risk survey of high-risk pregnant women (1990). Source: raw data reports. Contact: Michael Gross, Abt Associates, 55 Wheeler Street, Cambridge, MA 02138; (617) 492-7100. Conducted at King/Drew Medical Center, Project MAMA provides AIDS education and skills training for pregnant women at risk for HIV infection. Women are recruited through health clinics, social service agencies, and street outreach. As of July 1990, 298 cases were

enrolled in Project MAMA. Injection drug use was reported by 99 cases.

HIV antibody testing at alternative test sites (1989-90). Source: raw data reports. Contact: Galia Karapetian, Los Angeles County AIDS Program Office, 600 S. Commonwealth Avenue, Los Angeles 90005; (213) 351-8128. Anonymous testing is available at seven alternative test sites in the county. Over 25,000 tests were conducted during 1989-90. In about 1,600 (7%) of these cases, a history of injection drug use was reported as a risk factor.

AIDS risk survey of homeless adults (1990). Source: raw data files. Contact: Michael Cousineau, 1010 S. Flower Street, Los Angeles 90015; (213) 744-0724. As of August 1990, the Los Angeles Homeless Health Care Project has interviewed an intake sample of 519 adults at county homeless shelters. A subsample of 136 cases has reported injection drug use. Questions cover drug- and sex-related AIDS risk behaviors.

AIDS risk survey of adolescent arrestees (1990). Source: raw data files. Contact: Kiku Annon, UCLA Drug Abuse Research Group, 1100 Glendon Avenue #673, Los Angeles 90024; (213) 825-9057. In mid 1990, the Drug Use Forecasting (DUF) Project began interviews of incoming adolescents at Los Angeles detention facilities. Data are available for 162 cases, of whom 2% reported injection drug use.

AIDS risk survey of users of crack cocaine (1990). Source: Boyle and Anglin (1990). Contact: Kathleen Boyle, UCLA Drug Abuse Research Group, 1100 Glendon Avenue #673, Los Angeles 90024; (213) 825-9057. This study collects in-depth data on sex-related AIDS risks among crack smokers. A convenience sample of 42 crack smokers has been identified through street outreach and interviewed in person. Antibody testing has been provided for 28 crack smokers, of whom six (21%) have tested positive. This finding may not reflect AIDS risk among Los Angeles crack users overall because (1) the sample is quite small, and (2) results may be influenced by self-selection (motivation to accept the offer of testing may have been strongest among crack smokers at highest risk of AIDS).

STUDIES IN PROGRESS: DATA NOT AVAILABLE

HIV antibody testing and AIDS risk survey of cocaine users (1988-91). Sources: Kowalewski et al. (1990); raw data reports. Contact: Hari Khalsa, UCLA Drug Abuse Research Group, 1100 Glendon Ave. #763, Los Angeles 90024; (213) 824-6709. Conducted at the Los Angeles Veterans Administration Medical Center, this study is assessing alternative strategies for treatment of cocaine dependence. While in treatment, 285 clients entered the study and will be re-interviewed twice, at yearly intervals, to assess post-treatment behavior. Antibody status has been determined through blood-specimen testing or self-report for 100 clients, of whom three (3%) are antibody positive. This rate may not be a reliable indicator of HIV infection risk among injection cocaine users, and was not cited in the report, for two reasons. First, follow-ups are not complete. Former clients who are especially difficult to locate and interview may be at higher risk due to continued use of illicit drugs and/or mental health problems. Second, few cases (16%) reported using cocaine by injection.

HIV antibody testing in drug abuse treatment clinics (1989-91). Contact: Wes Ford, Los Angeles County AIDS Epidemiology Program, 600 S. Commonwealth Ave., Los Angeles 90005; (213) 351-8202. The AIDS Epidemiology Program has conducted confidential testing for approximately 2,300 clients in selected outpatient and residential treatment programs. Data have not yet been analyzed and reported for the residential treatment clients.

AIDS risk survey of the general population and gay/bisexual men (1989-90). Contact: Elizabeth Yano, RAND Corporation, 1700 Main, Santa Monica 90406; (213) 393-0411. Under a contract with the Los Angeles County AIDS Program Office, the RAND Corporation conducted a telephone survey in 1989-90 among a random sample of Los Angeles County residents (n = 1,305). To provide a large gay/bisexual subsample, this study oversampled in census tracts known to contain relatively high proportions of gay/bisexual residents. Data have not been released. But the number of injection drug users found in other population-based surveys has been too low for meaningful analysis (see completed studies).

AIDS risk survey in a Pico Rivera drug abuse treatment clinic (1990). Source: raw data reports. Contact: Ernesto Parra, University of Texas Health Sciences Center, San Antonio, TX 78284; (512) 270-3909. Based at Cornerstone Health Services (a methadone maintenance clinic in Pico Rivera), this study focuses on Hispanic men and their sexual partners. The sample size is 130. Interviews concern AIDS-related knowledge, attitudes, and behaviors, especially as regards sexual transmission of the virus.

AIDS risk survey of incarcerated adolescents (1990). Contact: Carl Rowe, California Drug Consultants, 4219 West Olive #103, Burbank 91505; (818) 785-6143. About 2,000 interviews have been conducted among youth held at Los Angeles units of the California Youth Authority. Data analysis is pending.

HIV antibody testing and AIDS risk survey of prostitutes (1990-91). Contact: Sandy Berry, RAND Corporation, 1700 Main, Santa Monica 90406; (213) 393-0411. In May 1990, this survey began its pilot phase. A sample size of 1,000 is planned. Recruited through referral and outreach in selected neighborhoods, participants will include prostitutes working on the streets and in clubs, massage parlors, and other locations. Survey items will cover sex- and drug-related AIDS risk, physical and mental health, and personal history.

HIV antibody testing and AIDS risk survey of black men (1990-91). Contact: Vickie M. Mays, UCLA Department of Psychology, Los Angeles 90024; (213) 825-9858. In June 1990 this study began antibody testing and interviewing of men recruited through street-based outreach and agency referrals. Upon completion, the sample may include enough drug-user cases for useful analysis of drug-related AIDS risk and HIV infection.

APPENDIX 2: SAMPLE COMPOSITION

Variability in the composition of study samples can complicate the interpretation of seroprevalence data. As noted in Section 2, seroprevalence in some areas of the country is higher for gay/bisexual men than for injection drug users (National Academy of Sciences, 1988; Turner et al., 1989); higher for blacks and Hispanics than for non-Hispanic whites (Des Jarlais and Friedman, 1988; Turner et al., 1989; Watters and Lewis, 1990); and higher for people who inject cocaine instead of, or in addition to, opiates (Amsel et al., 1990; Chaisson et al., 1989; Des Jarlais and Friedman, 1988; Iguchi et al., 1990; Nemoto et al., 1990; Watters et al., 1988a; Wiebel et al., 1990). Gender differences may also exist, with seroprevalence higher for women (Des Jarlais and Friedman, 1987b; Lewis and Watters, 1988; Marmor et al., 1987).

Some studies of Los Angeles drug users have reported seroprevalence not just for the entire sample but also for demographic and drug-preference subsamples. Those studies provide some indication of the extent to which differences in sample composition might affect the range of seroprevalence rates found in studies that report data only for overall samples. This appendix presents our analysis of the data available on drug-user subsamples.

We have concluded that sample composition makes very little difference in the interpretation of the Los Angeles data for two reasons. First, seroprevalence rates vary only slightly across subsamples. An exception occurs in the comparison of heterosexuals to gay/bisexual men, but this exception has no important effect on the interpretation of overall rates. Moreover, we believe that full-sample seroprevalence rates are the best single indicator of infection risk among Los Angeles injection drug users. These conclusions are supported below.

SUBSAMPLE SEROPREVALENCE RATES

Seroprevalence was reported by sexual orientation in treatment-based studies by the AIDS Epidemiology Program and the Los Angeles Drug Abuse Program Office (DAPO). Gay/bisexual male drug users had higher infection rates (ranging from 7.9% to 17.1%). But there are relatively few gay/bisexual men in these samples, so rates for heterosexual subsamples (1.2% to 3.7%) do not differ from overall sample rates (2% to 3%).

Seroprevalence was reported by sexual orientation in non-treatment studies based in Long Beach, county STD clinics, alternative test sites, and a skid row health clinic attended by homeless adults. Again, small subsamples of gay/bisexual men had higher seroprevalence rates (18% to 45%). Heterosexual rates (1.4% to 5.8%) are generally lower than rates reported for overall samples (4% to 10%). Thus, seroprevalence among heterosexual drug users not in treatment may be no higher than 6%. For reasons cited below, however, their actual infection risk is probably closer to the 8% rate we have estimated for injection drug users overall.

Seroprevalence by race/ethnicity was reported in treatment-based studies by DAPO and the AIDS Epidemiology Program. Rates among black drug users vary widely, from 1.7% to 18.2%. The latter percentage is based on only 22 cases; if it is omitted, the highest treatment-study rate for blacks is 9.5%, and their average seroprevalence rate is just over 4%. Rates among Hispanics range from 1.0% to 4.2%; among non-Hispanic whites, 2.2% to 4.1%.

Long Beach studies are the only non-treatment source describing racial/ethnic seroprevalence patterns. Rhodes (1990b) found no appreciable seroprevalence difference by

race/ethnicity (data not presented). This conclusion seems applicable to the other studies as well, with the proviso that seroprevalence may be higher among blacks.

Rates were reported by gender in treatment-based studies by DAPO and the AIDS Epidemiology Program. Rates for men range from 1.9% to 6.3%. The latter rate appeared among 207 men in DAPO's 1987 residential treatment study. The gay/bisexual subsample might have contributed to this relatively high rate, but infection was 4.9% even among heterosexual men. Across all other studies, the highest rate for men is 2.9%. For women, the treatment-study range is more narrow--1.2% to 3.5%.

Gender data were reported in non-treatment samples from Long Beach, county alternative test sites, and the UCLA Nursing Network study (which enrolled women only). Rates for men vary between 4.9% and 8.0%; for women, 1.4% and 5.3%. Thus, contrary to reports (cited above) from other cities, the Los Angeles data suggest that seroprevalence may be slightly higher for men than for women.

The final sample-composition variable covered here is primary drug of abuse. Though illicit drug use often involves more than one drug, methadone clients are being treated for dependence on opiates. Thus, studies conducted in methadone clinics include very few clients whose primary drug of abuse is not opiates. We found only one residential treatment study, which sampled clients reporting primary abuse of opiates as well as other drugs. There is no difference in HIV infection rates when clients whose drug use history indicates more opiate use than cocaine use (5.2%) are distinguished from clients whose history indicates more cocaine use (5.0%).

Seroprevalence by primary drug of abuse was reported in the non-treatment Long Beach studies. 1988 data show rates of 3.9% for opiate injectors, 7.5% for injectors of cocaine by itself or in combination with heroin, and 7.1% for amphetamine injectors (Rhodes et al., 1990a). But these differences did not hold up in the much larger 1989-90 Long Beach sample, where seroprevalence is roughly equal (5.3% to 5.6%) regardless of primary drug of abuse.

In summary, seroprevalence rates are higher for gay/bisexual male drug users than for heterosexual drug users. But samples are predominantly heterosexual, so this difference has little impact on rates found in samples as a whole. Seroprevalence may be higher among blacks and men, but racial/ethnic and gender differences found here are slight and may not be meaningful. We found no reliable evidence that seroprevalence differs by primary drug of abuse.

SEROPREVALENCE DATA AS INDICATORS OF HIV INFECTION RISK

Despite subsample differences, we believe that full-sample findings are a better indicator of HIV infection risk. First, seropositive "base rates" in Los Angeles are quite low. Second, HIV infection risk is determined not strictly by seroprevalence rates in separate drug-user categories but also by the mixed social ecology of use.

Consider first the issue of base rates. In areas where seroprevalence is low, it is difficult to detect subsample differences, however large. Seroprevalence in Group One may be 2%, for example. If HIV infection is twice as high in Group Two, its seroprevalence rate is still just 4%. Only with huge sample sizes could these rates be taken as evidence of a real difference between groups. (This problem does not apply in most analyses of AIDS risk behavior because the base rates are higher. In Group A, 30% might report using condoms,

compared to 60% in Group B. Even with moderate sample sizes, it is possible to determine whether this difference is real. See analyses of AIDS risk behavior in Sections 3 and 4.)

Second, subsample distinctions are artificial in the sense that drug users very often cross demographic and drug-preference boundaries. It is likely that many gay/bisexual men who inject drugs (especially men who do so on a regular basis) associate with heterosexual drug users, who may not know or care about their partners' sexual orientation. The same is true regarding drug preference (heroin versus cocaine), in part because many users regularly inject both drugs. We have analyzed some indicators of cross-over through the UCLA Follow-up Study, which is recontacting drug users who participated in DAPO's 1986-87 studies. Over 350 injection drug users have been reinterviewed thus far. Among users who shared injection equipment in the past year, almost half (45%) reported sharing with someone of another race/ethnicity. Over three-fourths (78%) reported sharing with someone of the opposite sex. Thus, the risk of HIV infection depends not simply on users' own demographic traits or drug preferences but also on the social ecology of their behavior: with whom do they inject drugs and have sex, and with whom do their partners inject drugs and have sex? Since the ecology of use is quite mixed, full-sample seroprevalence rates are probably a better indicator of HIV infection risk among Los Angeles injection drug users.

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