

HIV-1 Seropositivity and Behavioral and Sociological Risks Among Homosexual and Bisexual Men in Six Mexican Cities

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Summary: We report on the epidemiology of sexual behaviors, HIV-1 seroprevalence, and condom use in gay and bisexual men in six Mexican cities in 1988 and test the extent to which variations in sexual behavior and sociological risks are responsible for variations in prevalence. Seroprevalence rates among samples in six cities ranged from 2% to 25%. In multiple logistic regression models controlling for city, insertive/receptive behavior (IRB), and meeting partners in bathhouses, the following were independently related to seropositivity ($p < 0.05$): city, IRB, syphilis, sex with a person with AIDS, and meeting partners in bathhouses. The independent risks associated with categories of IRB were no or almost no activity (odds ratio 1.0), only insertive (3.0), mostly insertive (4.9), mixed (6.0), mostly receptive (3.3), and only receptive (0.9). The condom use rate on last sexual encounter was 30%. The main sexual risk for HIV-1 infection is not exclusively receptive anal sex, but rather mixed behavior. This association may be explained by the infectious state of the partner pools. The sociologic risk variables (national and local partner pools) are better predictors of seroprevalence than behavioral variables, such as the number of partners or use of condoms. These results imply that more effective individual strategies for risk reduction are needed, including better knowledge concerning the risk status of partners. **Key Words:** HIV-1—Homosexual—Bisexual—Mexico—Insertive and receptive behavior—Sex roles.

Very limited data exist concerning human immunodeficiency virus-1 (HIV-1) seroprevalence among homosexual and bisexual men in Spanish-speaking countries of the Americas. Similarly, limited data are available concerning sexual behaviors and con-

dom use in these populations. Case reports from Mexico (1,2) and other Latin American countries (3) suggest that the epidemiological pattern of the AIDS in Latin America is different from that observed in other parts of the world. The main characteristics of this pattern include a low incidence of intravenous drug use among those infected, a substantial prevalence of infected bisexual men, and early and rapid growth in heterosexual and perinatal AIDS cases.

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There were 3,512 AIDS cases reported in Mexico up to January 1, 1990, placing Mexico fourth highest in AIDS incidence among countries in the Americas. Most of the adult cases (82%) are associated with sexual transmission: 16% are associated with heterosexual transmission, 43% with male homosexual practices, 23% with male bisexual practices. Fifteen percent are associated with blood transmission; very few are associated with I.V. drug use. The male-to-female ratio is 7 to 1 and has been decreasing rapidly.

Surveys indicate a low seroprevalence of HIV-1 in the heterosexual population. Surveys among female prostitutes in six cities indicated seroprevalences of <1% in both 1987 and 1988 (4). In male prostitutes seroprevalence estimates of 2–16% in 1986 and 1987 have been documented (5).

Some reports have noted a substantial amount of bisexual behavior among Mexican men, particularly anal insertive behavior in those men who prefer not to be labeled as homosexuals. In addition, distinctive roles for those exclusively practicing either receptive or insertive anal intercourse have been described (6,7). It is not known to what extent these patterns of sexual behavior, or to what extent the sociological networks of partners associated with these behaviors, have influenced the spread of HIV-1 in Mexico.

For example, a study of homosexual and bisexual men in the United States indicated a strong relationship of receptive anal intercourse to incidence of infections, and no clear independent risk of insertive anal intercourse (8). It has also been suggested that men who practice either exclusively insertive or exclusively receptive anal intercourse might experience a lower incidence of HIV infection (9). These two interpretations could be explained by the serological status of the sociological networks associated with these behaviors. Individuals in some populations practicing only receptive anal intercourse could be having sex with partners with a low seroprevalence of HIV-1; this group could include partners who practice only insertive behavior and who identify themselves as heterosexual. The present data provide an opportunity to examine these relationships in a country with a substantial prevalence of both exclusively insertive and exclusively receptive anal sexual behavior.

We report on the epidemiology of sexual behaviors, HIV-1 seroprevalence, and condom use in gay and bisexual men in six Mexican cities in 1988. We

examine the patterns of sexual behavior and sociological risks in these populations—in particular, variations in partner pools—and test the extent to which different patterns of sexual behavior and sociological risks might be responsible for variations in prevalence. Implications of these findings for the design of national AIDS educational and behavioral intervention programs are discussed.

METHODS

Seroprevalence surveys among homosexual and bisexual male populations were carried out in each of the six cities studied: Mexico City, Guadalajara, Monterrey, Acapulco, Merida, and Tijuana. These cities were selected because they represent different geographic areas and epidemiologic patterns of AIDS cases. The first three cities are the largest cities in Mexico, where about one-third of the Mexican population live; the last three are resort cities. In each city, clusters of places for subject recruitment were identified; for example, in Guadalajara project staff identified seven gay discos, two gay bars, one park, and two gay organizations (with their own buildings). Similar surveys had been done the year before in the same cities, and this experience facilitated the identification of clusters.

Surveys were anonymous, and the management of the information was confidential. Participants were assured that results would not be published in any way that individuals could be identified. Because of the anonymous nature of the interview, only oral informed consent was obtained, in accordance with the institutional review boards of the funding agencies and the Mexican Ministry of Health research and ethics committee.

Each survey was carried out over a 10-day period, including two weekends. There were two sets of interviewers who carried out the survey simultaneously in different cities, making it highly unlikely that the same individuals participated in more than one city. Most interviewers were gay, and the surveys were supported by gay groups in the cities. Most of the interviews in bars, discos, and parks took place after 6 p.m., continuing until 4 or 5 a.m. Gay organizations were visited during the day.

The interviewers generally began their interviews with conversations. After 2–3 min they would introduce themselves as part of the staff and ask if the person wanted to participate in an anonymous survey. If they had already participated previously in

this survey, they were not eligible for a new interview. Because of the sensitive nature of the questions asked, some individuals refused the interview. We cannot assume that the sample is completely representative of the population engaging in homosexual practices in these cities—in particular, we believe the sample underrepresents homosexual and bisexual men who are not very sexually active.

About 10% of the individuals who were asked to participate in the survey refused. A total of 715 completed interviews were obtained, with an approximately equal distribution among the six cities. Blood samples were obtained from 90% of those interviewed. Blood samples were taken on site (if an appropriate room was found) or in a van. Samples were centrifuged for plasma separation and refrigerated locally and then sent to a central laboratory in Mexico City for processing. Results were given to individuals who asked for them through the normal counseling and screening services in the cities under study.

Antibody status to HIV-1 was determined by two positive ELISA tests and one positive confirmatory test [immunoelectrotransference, Western blot, and/or immunofluorescence assay (IFA)].

Insertive-receptive behavior (IRB) was determined by combining answers to two questions concerning behaviors of the respondent over the previous 4 months; it has six mutually exclusive categories: only anal insertive, mainly or mostly anal insertive, both anal insertive and receptive during half or more of the sexual encounters ("mixed"), mainly or mostly receptive, only anal receptive, and those reporting no or almost no anal intercourse. We cannot distinguish the precise behavior of individuals classified as mixed; they likely include people who engage in insertive and receptive practices with each partner as well as individuals who were receptive with some partners and insertive with others.

Sexual behavior data are based on respondent answers to questions concerning the number of sexual partners in the 4 months before the survey. Those who reported having sex with women in the last year were termed bisexuals.

Condom use was indicated by whether the individual reported use of a condom in his last sexual encounter, taking into account only those who had sexual relations in the previous 4 months. Having had a sexually transmitted disease (STD) was determined through the questionnaire; there were no

laboratory or clinical diagnoses for any of the respondents. Nonresponse rates for questions concerning condom use and sexual practices were 1–2%.

The sociologic risk variables refer to risks that arise via social networks and social interactions that influence the selection of partners: residence in particular areas and the frequenting of bathhouses generates social networks and interactions that, in turn, influence partner selection. Behavioral risks, in contrast, refer to specific sexual practices or techniques.

The relative risk of seroprevalence was estimated by the odds ratio, using the maximum likelihood method; chi-square statistics were estimated for differences in odds ratios. Logistic regressions were estimated using SAS CATMOD (10). Sample sizes given in the tables vary slightly because of missing data.

RESULTS

Table 1 provides descriptive data concerning participants in the six cities, including the seroprevalence for HIV-1. The variables have been grouped into four categories: sociodemographic, sociological, behavioral, and health risks. Because the IRB measure indicates both behavioral (e.g., mixed behavior) as well as sociological (partner pools) risks, it has been classified as sociological/behavioral.

One notable characteristic of the sample includes the relatively high educational status of participants: almost 60% of the sample had completed some post-secondary education. Twenty-seven percent of the sample were bisexual; 3% were married. The mean estimated number of sexual partners in the previous 4 months was 4.1 (SD 7.0); 45% of the sample reported none or one sex partner in the previous 4 months.

One-fourth of the sample reported no or almost no insertive or receptive sexual encounters. The distribution of IRB among homosexuals and bisexuals (data not presented) shows that for those who are exclusively homosexual, there is a greater frequency of only receptive behavior, but a substantial proportion are also involved in insertive practices. For bisexuals the trend is in the opposite direction. Two distinct patterns of IRB were observed among the cities, one for Mexico City, Tijuana, and Guadalajara and a second for Acapulco, Monterrey, and Merida (Fig. 1). The first pattern includes a greater

TABLE 1. HIV-1 seropositivity according to sociodemographic, sociological, behavioral, and health-risk characteristics of homosexual and bisexual men in six Mexican cities, 1988

Characteristics	HIV ⁺		Relative odds			
	n	%	Bivariate	p	Multivariate ^a	p
Sociodemographic						
Age (years)						
13-19	182	8.8	1.0	0.05	1.0	0.76
20-24	263	10.3	1.2		1.0	
25-29	141	15.6	1.9		1.1	
30-68	72	19.4	2.6		1.5	
Completed education						
None/incomplete secondary	143	7.7	1.0	0.05	1.0	0.28
Secondary	126	13.5	1.9		2.1	
Post-secondary	308	11.0	1.5		1.2	
University	79	20.3	3.1		1.5	
Sexual practice						
Homosexual	482	10.8	1.0	0.56	1.0	0.19
Bisexual	176	12.5	1.2		1.5	
Marital status						
Single	637	12.1	1.3	0.72	1.0	0.99
Married	21	9.5	1.0		1.0	
Sociological						
City						
Mexico D.F.	135	25.4	14.1	0.0000	10.1	0.0007
Guadalajara	104	13.5	6.3		5.2	
Merida	95	11.6	5.3		5.2	
Acapulco	98	9.2	4.1		4.2	
Tijuana	102	6.9	3.0		2.5	
Monterrey	124	2.4	1.0		1.0	
Meet partners in baths/saunas						
Yes	83	26.5	3.3	0.00001	2.7	0.002
No	575	9.9	1.0		1.0	
Sociological/Behavioral						
Insertive/receptive behavior (IRB)						
No/almost none	159	4.4	1.0	0.00001	1.0	0.009
Only insertive	58	12.1	3.0		2.8	
Mostly insertive	125	18.4	4.9		3.7	
Mixed	116	21.6	6.0		4.6	
Mostly receptive	98	13.3	3.3		3.3	
Only receptive	102	3.9	0.9		1.1	
Behavioral						
Number of partners previous 4 months						
0	80	3.8	1.0	0.04	1.0	0.83
1	215	11.2	3.2		1.4	
2-5	262	13.0	3.8		1.5	
≥6	99	18.2	5.7		1.8	
Used condom/last encounter						
Yes	196	13.8	1.2	0.41	1.1	0.66
No	453	11.5	1.0		1.0	
Health Risks						
Ever had gonorrhea						
Yes	171	18.1	2.0	0.005	1.6	0.11
No	487	9.7	1.0		1.0	
Ever had syphilis						
Yes	43	23.3	2.4	0.02	2.2	0.06
No	611	10.7	1.0		1.0	
Sex with person with AIDS						
Yes	15	40.0	5.2	0.002	6.5	0.003
No	643	11.4	1.0		1.0	

^a Multivariate odds ratios are derived from a logistic regression that includes controls for city, IRB, and meeting partners in baths or saunas (n = 658).

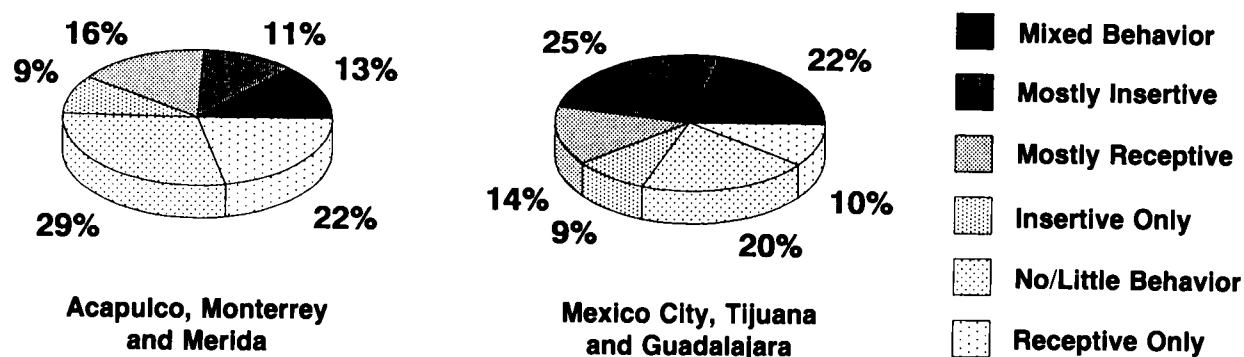


FIG. 1. Patterns of insertive and receptive behavior among homosexual and bisexual men in six Mexican cities, 1988.

prevalence of mixed anal sex and a lower prevalence of exclusively receptive behavior.

The prevalence of HIV-1 infection in these samples ranged from 2% to 25%. As indicated in Table 1, there is evidence of increased seropositivity among older men in the sample and among the most highly educated, and evidence for substantially higher rates of infection among men in Mexico City (25%).

There were substantially increased risks of seropositivity among those individuals reporting mixed anal intercourse. The lowest rates of seropositivity were found among individuals reporting either exclusively receptive or exclusively insertive anal intercourse and among those reporting little or no anal intercourse (Fig. 2). Eleven percent of the sample indicated that they met sex partners in baths or saunas; substantially higher risks of HIV-1 are in-

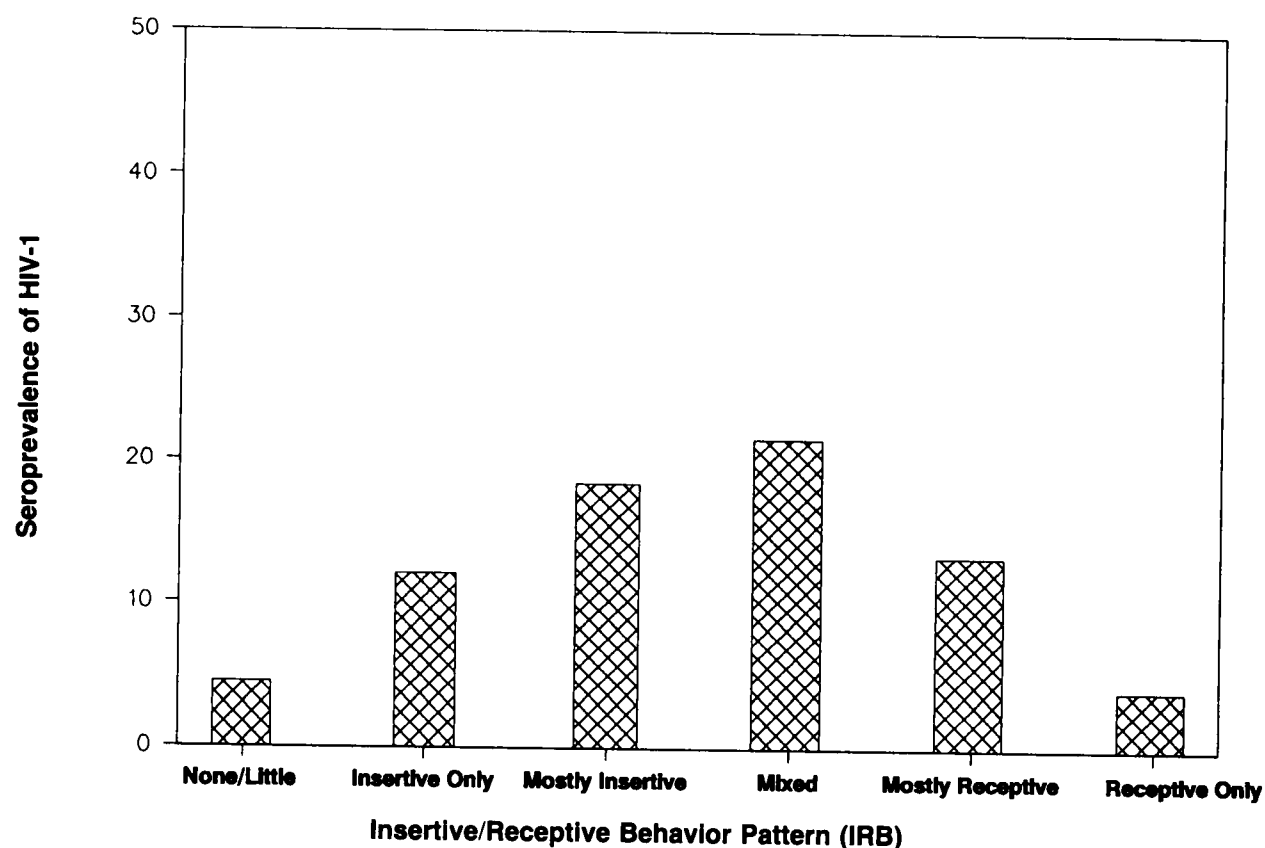


FIG. 2. Seroprevalence of HIV-1 by insertive and receptive behavior, homosexuals, and bisexuals in six Mexican cities, 1988.

licated among this group. This finding is particularly true in Mexico City, where the prevalence among those who met partners in baths was 62%, compared with 20% among those who did not.

Among the behavioral measures, there was evidence for increased risk of seropositivity among those with a greater number of sexual partners in the previous 4 months. Higher rates of HIV-1 were also associated with a history of gonorrhea or syphilis infection and with a history of sexual relations with someone with AIDS.

Multiple logistic regressions were estimated, controlling for city, meeting partners in baths, and IRB. The independent risks controlling for these variables are given in Table 1. The largest independent risks were those associated with an individual's residence in Mexico City [odds ratio (O.R.) 10.1], the practice of mixed anal intercourse behavior (O.R. 4.6), a report of having sex with someone with AIDS (O.R. 6.5), and meeting partners in baths or saunas (O.R. 2.7).

After controlling for IRB, city, and meeting partners in baths or saunas, there was no independent contribution of age, education, sexual practices (exclusively homosexual versus bisexual), marital status, number of partners in the previous 4 months, use of condom during last sexual encounter, history of gonorrhea or syphilis, or reporting sexual relations with foreigners.

Overall, 30% indicated using a condom in their last sexual encounter. Correlates of condom use are displayed in Table 2. The factors that emerge as predictive of condom use in the multivariate model were city, IRB, meeting partners in baths or saunas, and reporting sexual relations with foreigners. When condom use on the last encounter was entered into a multivariate logistic regression predicting HIV-1 seropositivity, the coefficient estimate indicated no difference in risk (O.R. 1.1; $p = 0.66$) between those using and not using a condom. This might be because infection had occurred before condom use was initiated.

As expected, the respondents did not report much use of HIV-1 counseling and testing services. Only 32% of the respondents indicated they had been tested, but of these, 25% did not know their status, and 73% said they were negative. None of the individuals who were positive reported having a previous test, and one person who claimed to be positive had a negative test result. The main reasons given for not having had a test included no

interest (37%), not considering it necessary (20%), fear (19%), and lack of information (18%).

DISCUSSION

Our findings indicate that there are differences in the pattern of IRB across the cities under study. These differences, in turn, account for part of the wide variability in seroprevalence found among the six Mexican cities. Cities with more mixed behavior exhibited higher rates of seroprevalence.

The fact that individuals reporting only receptive anal behavior appear to have a lower rate of seroprevalence of HIV-1 than individuals reporting mixed behavior has not been reported in the literature, which has generally identified receptive intercourse as the higher-risk practice (8). However, the low risk of exclusively insertive or receptive behavior has been discussed by Trichopoulos and associates as perhaps being due to the relative isolation of these groups from the risk of seroconversion (9). One reason for this relative isolation could be that mixed behavior more efficiently transmits the virus from partner to partner, and hence the mixed partner pool has a greater reservoir of infection. Conversely, individuals practicing only receptive behavior could be having sex with individuals with lower prevalence rates; such individuals could include those who practice only insertive behavior and identify themselves as heterosexual. Very distinctive social networks, or partner pools, thus appear to be associated with the IRB scale.

Our findings do not mean that there are not risks, for anatomical reasons, of being anal receptive, but rather that the selection of sexual partners (infected or noninfected) conditions the existence of risk from anal-receptive coitus: any person can be anal receptive without risk of acquiring HIV if all his sexual partners are not infected.

The results also indicate the increased risk posed by rates of seropositivity in the surrounding community (i.e., the city partner pool) as well as the substantial risk associated with meeting partners at baths or having sexual relations with someone with AIDS. Thus, a main message of the current findings is that the risks posed by these distinctive sociological characteristics—the partner pools or networks—are the most powerful predictors of seroprevalence in these six Mexican cities. These variables are better predictors of risk than the distinctively behavioral measures, such as the num-

TABLE 2. Use of condom during last sexual encounter according to sociodemographic, sociological, behavioral, and health-risk characteristics^a

Characteristics	Condom use		Relative odds			
	n	%	Bivariate	p	Multivariate ^b	p
Sociodemographic						
Age						
13-19	192	31.3	1.0	0.39	1.0	0.24
20-24	287	27.5	0.8		1.2	
25-29	146	28.8	0.9		1.1	
30-68	81	37.0	1.3		1.3	
Completed education						
None/incomplete secondary	152	21.7	1.0	0.02	1.0	0.22
Secondary	136	30.9	1.6		0.7	
Post-secondary	333	30.3	1.6		0.7	
University	83	41.0	2.5		1.1	
Sexual practice						
Homosexual	341	25.8	1.0	0.34	1.0	0.91
Bisexual	365	33.7	1.2		1.0	
Marital status						
Single	683	29.9	1.0	0.95	1.0	0.86
Married	23	30.4	1.0		1.1	
Sociological						
City						
Monterrey	125	18.4	1.0	0.0001	1.0	0.0001
Merida	95	22.1	1.3		1.1	
Acapulco	108	23.2	1.3		1.3	
Mexico D.F.	136	30.9	2.0		1.6	
Guadalajara	107	35.5	2.4		2.3	
Tijuana	135	45.9	3.8		3.2	
Meet partners in baths/saunas						
Yes	84	20.2	1.0	0.04	1.0	0.02
No	622	31.2	1.8		2.2	
Had sex with foreigners						
Yes	234	39.3	1.9	0.0001	1.7	0.005
No	472	25.2	1.0		1.0	
Sociological/Behavioral						
Insertive/receptive behavior (IRB)						
No/almost none	172	22.1	1.0	0.002	1.0	0.002
Only insertive	63	34.9	1.9		1.6	
Mostly insertive	131	38.9	2.3		1.9	
Mixed	125	38.4	2.2		2.0	
Mostly receptive	105	25.7	1.2		1.1	
Only receptive	110	22.7	1.0		1.0	
Behavioral						
Number of partners previous 4 months						
0	88	19.3	1.0	0.15	1.0	0.56
1	232	31.0	1.9		1.3	
2-5	283	31.1	1.9		1.2	
≥6	103	33.0	2.1		1.7	
Health Risks						
Ever had gonorrhea						
Yes	180	37.8	1.6	0.007	1.3	0.14
No	526	27.3	0.0		1.0	
Ever had syphilis						
Yes	47	42.6	1.8	0.05	1.8	0.07
No	659	29.0	1.0		1.0	
Sex with person with AIDS						
Yes	17	41.2	1.7	0.31	1.4	0.58
No	689	29.6	1.0		1.0	

^a Only those who had sexual relations in the previous 4 months were included.^b Multivariate odds ratios are derived from a multiple logistic regression, which includes controls for city, IRB, and meeting partners in baths or saunas (n = 660).

ber of sexual partners or the use of condoms. The primary importance of the risk posed by the seroprevalence of partner pools has also been noted by Fineberg in his analysis of the effects of education and behavioral changes in the prevention of AIDS (11). A limitation of the present analysis, however, is that we do not have any direct evidence concerning the serologic status of partners.

For example, we can illustrate these differences with the coefficient estimates from the multivariate logistic regression models. The multivariate odds ratios in Table 1 indicate that a man from Mexico City who practices mixed behavior experiences a risk up to 46 times greater than for the lowest-risk men in the survey (men from Monterrey who are only receptive). In contrast, the independent risk associated with the highest number of partners (six or more) is only 1.8 times greater than the risk of HIV-1 seropositivity among those men reporting no partners in the previous 4 months (odds ratio not significantly different from 1.0).

It should be noted that it is difficult to interpret the relationship between seropositivity and numbers of partners during the previous 4 months in a causal sense. While we expect that having more partners should increase the risk of exposure, in fact, individuals at great risk could have just changed their behavior in response to their perceived risk and thus not have had any partners recently. The same issue arises in interpreting the coefficient from the multivariate equation relating condom use and seropositivity: on the one hand, we expect that frequent condom use will reduce risk, although this effect could be small because of the imperfect effectiveness of condoms (11). However, individuals at risk could also have just begun using condoms in response to their awareness of the risk; this awareness could occur years after infection.

In order to test this alternative explanation, respondents were asked in the survey if they had changed their sexual behavior since the national AIDS campaign started in Mexico in 1987. There was no relationship between those indicating change and those with seropositivity ($p = 0.34$), although condom use on last encounter was reported more frequently among those reporting behavior change since 1987 ($p = 0.04$).

Another explanation for the lower risk associated with exclusively receptive anal sex could be that there is underreporting of receptive anal intercourse in the samples under study, and hence substantial classification error could have occurred in this vari-

able. As Carrier has noted, there is significant stigma attached to a man engaging in receptive anal intercourse in Mexico, but not to "masculine" men who play the active inserter role in sexual intercourse with other men (6,7). This misclassification bias would tend to attenuate the relationship between receptive anal sex and seropositivity, although we have no evidence of such bias. Very similar patterns of IRB and risks associated with it have been found in another study in Mexico City among gay and bisexual men attending a center for HIV-1 screening and counseling (M. Hernandez, personal communication, 1990).

CONCLUSIONS

In summary, the levels of seropositivity reported in these samples are consistent with reported AIDS cases, indicating that the epidemic in Mexico varies among cities. Estimated seroprevalence rates are substantially lower than levels reported in homosexual populations in the United States and other industrialized countries. The wide range in estimated seroprevalence (2–25%) indicates the uneven spread of the virus into different urban populations in Mexico. The relatively low rates seen in these samples compared with the United States suggest that there is an opportunity to halt the growth of the epidemic in Mexico at a much earlier stage than in the U.S.

In this population, the IRB measure is an important covariate of risks and may be a useful tool for modeling the AIDS epidemic in other Latin American countries. These data also highlight the need for more intensive methodological research concerning the measurement of sexual activity in various cultural and ethnic groups. While many interview questions should be applicable across a wide variety of populations, validation studies and culturally specific approaches are needed.

The rates of reported condom use in these samples were relatively low; overall, 30% of the sample reported using a condom in their last sexual encounter. This level of use will have relatively little impact in preventing further population increases in HIV-1 infection rates in the long run, although some individuals will be protected from infection, and such use of condoms may significantly slow the course of the epidemic (11). It is encouraging to note that the highest rates of reported use were in the cities with the highest seroprevalence rates and in the geographic areas that have received early ed-

ucational interventions and the most substantial quantity of media and educational materials as part of the national AIDS educational campaign. Further evaluations of other educational programs in Mexican cities are now under way.

The fact that none of 75 seropositive individuals in the sample indicated they were seropositive points out the need for better confidential and anonymous testing services in these cities. This is particularly true for homosexual and bisexual men—the groups with the greatest number of diagnosed AIDS cases in Mexico and, at the same time, the most difficult populations to reach. It is important to note the prevalent bisexuality in these samples; it could be a key behavior for development of the epidemiological pattern in Mexico and in other Latin American countries, such as Brazil (12).

The design, planning, and implementation of prevention programs must take into account the findings shown in this paper for specific interventions. The evidence in this paper that points to the importance of sociological risk factors associated with patterns of sexual behavior (IRB), local partner pools, and the risks associated with baths and saunas have direct implications for AIDS campaigns. Much of the focus of AIDS campaigns has been on reducing partners and using condoms. Our results indicate the need to stress further the risks associated with particular partners: avoiding sex entirely with infected individuals is the most effective strategy an individual can follow to reduce risk and is particularly important when the local partner pool has a high seroprevalence. This strategy is not easy to implement because it requires that high-risk individuals know their seropositive status and willingly discuss it with their potential partners. We are aware that implementation of this approach could lead to forms of discrimination, and any plans for reducing risks in populations need to be carefully evaluated so that such effects can be prevented.

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