

Prevalence and Predictors of HIV Testing Among a Probability Sample of Homeless Women in Los Angeles County

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SYNOPSIS

Objectives. To describe the prevalence and predictors of HIV testing in a probability cluster sample of urban homeless women.

Methods. Analysis of data from the University of California Los Angeles-RAND Access to Health Care for Homeless Women of Reproductive Age Study, a survey conducted in six waves from January 1997 through November 1997 at shelters and soup kitchens in Los Angeles (LA) County, California. The sampling unit consists of homeless woman-visits, and data were collected using structured face-to-face interviews for which respondents were paid \$10. Each sampling unit was weighted to take into account the frequency with which the respondent used shelters or meal programs. The main outcome measure was receipt of HIV test in the past year.

Results. The response rate was 83%, and the final sample size was $N=970$. Sixty-eight percent of our sample reported receiving an HIV test in the past year, and 1.6% reported ever being diagnosed with HIV. HIV testing in the past year was most strongly associated with pregnancy in the past year (OR 2.99; $p<.001$) and having a regular source of care (OR 2.13; $p<.001$). Approximately 25% of homeless women with indications for HIV testing had *not* been tested in the past year.

Conclusions. The reported HIV seroprevalence of greater than 1% suggests that providers should offer and encourage HIV testing for all homeless women in LA County. Our data, which show a high rate of testing and few statistically significant independent predictors, indicate that this may be what is happening in practice.

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With the advent of effective new therapies for HIV infection, the importance of HIV testing for early diagnosis and treatment has never been greater. Yet we know little about utilization of this service among populations at highest risk for HIV. During the past decade the largest increases in HIV transmission have been among heterosexual women of reproductive age,¹⁻⁴ with poor and minority women disproportionately affected.⁵⁻⁸ Based on these demographic trends, urban homeless women are clearly at increased risk for HIV infection. There have, however, been no large-scale studies investigating rates of HIV and HIV testing in this group.

Guidelines for HIV testing in the general (non-military, non-incarcerated) adult population can be grouped into four general categories: (1) individuals who have clinical conditions associated with HIV infection (tuberculosis [TB], chronic candidiasis, etc.); (2) members of populations known to have a seroprevalence of at least 1%; (3) individuals with behavioral risk factors; and (4) pregnant women.^{9,10} Both the U.S. Public Health Service and the Institute of Medicine recommend offering HIV testing as a routine component of pre-natal care.^{11,12}

Prior research on relatively small community samples of the homeless population indicates that they meet testing guidelines more frequently than do their housed counterparts. Rates of clinical conditions such as TB and sexually transmitted diseases (STDs) are at least twice the national average.¹³⁻¹⁵ All homeless populations studied have had a seroprevalence of at least 1%.¹⁴⁻²¹ Previous work on community samples indicates that HIV risk behaviors are more prevalent among the homeless than among their housed counterparts.²²⁻²⁶ A study of New York City's homeless adults indicates that their pregnancy rate (19.5%) exceeds the national average (11%).^{27,28}

Even though homeless women's access to health services is dramatically different from their housed counterparts, no prior studies have investigated the predictors of HIV testing in this group.^{14,29} Previous work on HIV testing among other sub-populations of the urban poor suggests that youth, non-minority race/ethnicity, a history of HIV risk behaviors, and having a regular source of care may be significant predictors of HIV testing.³⁰⁻³⁴ The aim of this study is to determine the prevalence and predictors of HIV testing in a probability sample of homeless women in Los Angeles (LA) County.

METHODS

Sample

The University of California Los Angeles-RAND Access to Health Care for Homeless Women of Reproductive Age Study, a probability cluster sample of homeless women in LA County, provided the sample for this analysis.³⁵ A full discussion of the sample design appears elsewhere.³⁶ Briefly, a review of LA County social service directories and conversations with expert informants identified 236 shelters and 93 meal programs serving homeless women. Subsequent exclusion of sites that (a) were no longer in operation or not currently serving homeless women; (b) were very small or remote; (c) provided service only irregularly; or (d) declined participation reduced the sampling frame to 60 shelters and 18 meal programs. We conducted fieldwork in six waves from January 1997 through September 1997. We scheduled waves to ensure that we visited each site in all four quarters of the monthly cycle.

We defined a woman as homeless if she had spent any of the previous 30 nights (1) in a mission, homeless shelter, transitional shelter, hotel paid for by voucher, church or chapel, all-night theater or other indoor public place, abandoned building, car or other vehicle, the street or other outdoor public place; or (2) in a rehabilitation program for homeless people and had also stayed in one of the settings mentioned above during any of the 30 nights before entering a rehabilitation program for homeless people.

Homeless women over the age of 15 were eligible to be interviewed by trained lay interviewers. Lay interviewers went through an extensive training program that included specific instruction in how to assess the mental competence of all potential study subjects. Homeless women who were assessed as being (a) competent to provide informed consent and (b) capable of completing the interview were then provided with further information about the study. All potential survey respondents were informed that the aim of the study was to obtain information about homeless women's general health as well as their reproductive health. We collected data using structured face-to-face interviews conducted by the lay interviewers. Each interview lasted an average of one hour. Participants were paid \$2 for completing a screening interview and \$10 for a full interview. Each woman who completed an interview was assigned a unique identifier based on her date of birth and her mother's name.

The sampling unit is a homeless woman's visit to a shelter or soup kitchen, which is defined as a single visit by a homeless woman to one of our study sites. Of the total 2,428 woman-visits identified, 1,668 woman-

visits met the study criteria for homelessness. A total of 1,465 agreed to be interviewed at the time of the visit. We used the unique identifier codes to exclude 461 homeless woman-visits, because they represented repeat visitors. We completed 974 unique, non-repeat interviews and subsequently weighted each woman-visit to take into account the frequency with which she used shelters or meal programs. For the current analysis, we excluded four respondents who did not provide data on the outcome measure, HIV testing. Our final sample size is 970 homeless woman-visits.

Measures

Our analyses of the prevalence and predictors of HIV testing among homeless women are guided by an adapted version of the Behavioral Model for Vulnerable Populations, which posits that independent predictors of health service use can be categorized into three groups: predisposing, enabling, and need variables.³⁷

Outcome. The single outcome measure is a dichotomous variable: self-reported receipt of a blood test for HIV in the past 12 months.

Predisposing variables. Demographic data include age and marital status. Social structure is assessed with questions about race/ethnicity, education, social networks, residential history, competing needs, and victimization history. Dimensions of health status include physical health, mental health, substance abuse, and psychological resources. The sensitivity and specificity of the screeners for depression, alcohol abuse, and drug abuse were established using data from the Epidemiological Catchment Area Research Program in LA County.³⁸ The sensitivity of the depression screener is 81% compared to the full Diagnostic Interview Schedule, and the specificity is 95%. The sensitivity of the drug screener is 92%, and the sensitivity of the alcohol screener is 91%. The specificity of the drug screeners is 98% and the specificity of the alcohol screeners is 91%. We calculated single-dimension scores with weights for psychotic symptoms, mastery, and self-esteem with factor analyses. We extracted factors using the principal component method, after which we employed the varimax method. We analyzed all ordinal and interval scale measures quantitatively rather than categorically.

Enabling and need variables. Questions about income, public benefits, health insurance, regular source of care, and case managers yielded data on enabling variables. The indications for HIV testing assessed in this study are all classified as need variables. They include

a history of sexual risk behaviors (multiple male partners, intercourse without a condom, trading sex), injection drug use, a history of sexually transmitted diseases, and pregnancy with an estimated gestational age (EGA) of at least 12 weeks in the past year. Ectopic pregnancies and those that ended in abortion are excluded, because pre-natal care, including HIV testing, is not indicated in these situations. As with the predisposing variables, we analyzed all ordinal and interval scale measures quantitatively rather than categorically.

Analyses

To determine whether any of the potential independent variables were highly correlated which would create problems of collinearity in the regression models, we computed Pearson product-moment correlation coefficients. Because none of the variables were highly correlated ($r < 0.7$ in all cases), no further selection procedures were needed. We performed preliminary bivariate analyses for the outcome variable with each of the 35 independent variables. We selected independent variables having a correlation with the dependent variable with a p-value of < 0.1 for further analysis. We then calculated odds ratios with confidence intervals for each of the selected independent variables. The odds ratios for selected ordinal and interval scale variables are expressed per unit. Bivariate results were weighted to take into account the frequency with which subjects used shelters or soup kitchens.

We entered the 18 independent variables selected by the bivariate procedures into a standard multiple logistic regression model. Since the potential for cluster effects within shelters could not automatically be excluded, we applied the Huber method for model adjustment to the regression model.³⁹ Results are presented as odds ratios. We used Stata 6.0 to weight the descriptive statistics and to adjust for cluster effects in the final models and used SAS 6.12 for all other analyses.^{40,41}

RESULTS

Sample Characteristics

Tables 1 and 2 present demographic information and descriptive statistics for the sample. It should be noted that quantitative variables are presented categorically in Table 2 for clarity of presentation only; this categorical data was not used for the statistical analysis. The average rate of HIV testing in the previous year was approximately 70% for the entire sample, and fell between 60% and 70% for most categories studied.

Table 1. Weighted demographics of a probability cluster sample of homeless women in Los Angeles County (N=970)

Age (mean = 33)		
<25	17	70
25–34	35	62
35–44	47	72
>44	1	33
Marital status		
Married	10	71
Widowed/Separated/Divorced	31	68
Never married	59	59
Race/ethnicity		
White	16	67
Black	55	69
Hispanic	14	72
Other	14	59
Total income past month (mean = \$383)		
<\$50	25	61
\$50–500	45	74
>\$500	30	66

We found higher rates of 70% to 80% in women with childhood physical assault, physical assault in the past year, childhood sexual assault, a history of drug abuse/dependence, having a regular source of care, and all of the indications for testing. Approximately 1.5% of our total sample had ever been diagnosed with HIV.

Our sample was young (mean age 33), predominantly single, predominantly black, and the majority had at least a high school diploma or GED. More than a third reported childhood physical and sexual assault. During the previous year, a third had been physically assaulted and more than 1 in 10 were raped. Most described themselves as being in good physical health. Depression and substance abuse, however, were very common.

The majority of participants reported enabling factors that might facilitate HIV testing. Over half of the participants reported having had health insurance in the previous year, having received public benefits during the previous month, and currently having a case manager. Approximately 60% reported having a regular source of care.

Indications for HIV testing (need variables) were also common in this population. More than 60% reported having had intercourse with a male partner without using a condom; almost half reported having had a prior STD; about 40% reported multiple male sexual partners; and over 20% had traded sex in the

previous year. The rate of injection drug use was 8%. Ten percent reported a pregnancy with an EGA ≥ 12 weeks in the previous year. The rate for all pregnancies in the previous year was close to 25%.

Bivariate analyses. Eighteen out of 35 independent variables were significantly correlated with HIV testing in the previous year at the $p < 0.1$ level in preliminary bivariate analyses. Of our predisposing variables, education, three measures of severity of homelessness, childhood physical and sexual assault, depression, psychotic symptoms, alcohol abuse/dependence, and drug abuse/dependence were significant. Among the enabling variables studied, only having a regular source of care and receipt of public benefits in the previous month achieved significance. All of the indications for testing were significant at the $p < 0.1$ level.

Predisposing variables that were not significant at the $p < 0.1$ level included age, marital status, race/ethnicity, and age at first episode of homelessness. Having competing needs (such as difficulty finding food or bathing/bathroom facilities) was not correlated with HIV testing. Similarly, measures of social supports (frequency of social visits, number of local friends and relatives, whether or not a woman was currently living with a partner) were not statistically significant. Other predisposing variables that were not significantly correlated with HIV testing included a history of physical or sexual assault in the past year, physical health, level of physical functioning, and psychological scores of a sense of mastery and self-esteem. Among the enabling variables analyzed, neither income, having health insurance in the past year nor having a case manager was significantly correlated with HIV testing.

Logistic regression. Of the 18 independent variables that were significant at the $p < 0.1$ level in bivariate procedures, having a regular source of care, and pregnancy are the only significant independent predictors in the multiple logistic regression model. None of the predisposing characteristics are significant independent predictors. Results of this analysis are presented in Table 3.

The log likelihood ratio test (a type of F-test) for the regression model is significant at the $p < 0.01$ level. The p -value of the log likelihood ratio test is 0.002.

DISCUSSION

The rate of HIV testing in this probability sample of homeless women in LA County is among the highest reported for any population studied.^{15,30,31,42–45} These findings are concordant with previous work that has

Table 2. Weighted population characteristics of a probability cluster sample of homeless women in Los Angeles County (N=970)

Variable	Percent of total sample	Percent tested for HIV past year in each category	Variable	Percent of total sample	Percent tested for HIV past year in each category
Outcomes			Drug abuse/dependence, lifetime		
Ever diagnosed with HIV/AIDS	1.6		Yes	48	78
HIV tested past year	68		No	52	60
Predisposing variables			Enabling variables		
High school or GED			Public benefits past month		
Yes	63	67	Yes	54	68
No	37	70	No	46	68
Total time homeless (mean = 3 years)			Regular source of care		
<6 months	22	64	Yes	61	73
6–12 months	31	66	No	39	60
>12 months	47	73	Need variables		
Months homeless past year (mean = 6)			Multiple male sexual partners past year (mean = 8)		
<2	31	63	Yes	38	79
>2 and <6	31	68	No	62	62
>6	38	73	Unprotected intercourse past year		
Episodes homelessness, lifetime (mean = 5)			Yes	64	70
1–2	50	63	No	36	66
>2	50	73	Traded sex past year		
Physical assault at <18 years old			Yes	22	84
Yes	44	74	No	78	63
No	56	63	Injection drug use past year		
Sexual assault at <18 years old			Yes	8	89
Yes	32	74	No	92	66
No	68	65	Diagnosed with STD		
Depression past year			Yes	48	74
Yes	49	71	No	52	63
No	51	65	Pregnancy past year		
Psychotic symptoms (possible score 5–25)			Yes	10	77
≤5	55	64	No	90	67
5< and ≤7	19	75			
>7	26	26			
Alcohol abuse/dependence, lifetime					
Yes	39	77			
No	61	62			

Table 3. Odds ratios for unadjusted bivariate analyses and for logistic regression model predicting receipt of HIV test in the past year in a probability sample of homeless women in Los Angeles County (N=970)

Selected independent variables	Odds ratios	
	Unadjusted bivariate analyses	Logistic regression model
Predisposing variables		
High school or GED	0.73 ^b (0.55–0.97)	0.86 (0.62–1.18)
Total time homeless ^a	1.08 ^d (1.03–1.12)	1.03 (0.98–1.09)
Months homeless past year ^a	1.05 ^c (1.02–1.08)	1.01 (0.97–1.05)
Episodes homelessness, lifetime ^a	1.00 (0.99–1.02)	0.99 (0.97–1.00)
Physical assault at <18 years old	1.64 ^d (1.23–2.19)	1.28 (0.90–1.82)
Sexual assault at <18 years old	1.64 ^c (1.20–2.23)	1.20 (0.82–1.76)
Depression past year	1.53 ^c (1.16–2.02)	1.32 (0.95–1.82)
Psychotic symptoms ^a	1.02 (0.98–1.07)	0.96 (0.91–1.00)
Alcohol abuse/dependence, lifetime	1.74 ^d (1.30–2.33)	1.10 (0.77–1.58)
Drug abuse/dependence, lifetime	2.10 ^d (1.58–2.79)	1.31 (0.88–1.96)
Enabling variables		
Public benefits past month	1.30 (0.99–1.72)	1.16 (0.86–1.59)
Regular source of care	2.07 ^d (1.57–2.75)	2.13 ^d (1.56–2.90)
Need variables		
Multiple male sexual partners past year	1.92 ^d (1.41–2.60)	1.44 (0.99–2.11)
Unprotected intercourse past year	1.30 (0.98–1.72)	0.88 (0.63–1.21)
Traded sex past year	2.24 ^d (1.53–3.27)	1.22 (0.74–2.01)
Injection drug use past year	2.11 ^b (1.05–4.25)	1.23 (0.58–2.63)
Diagnosed with STD	1.59 ^c (1.21–2.10)	1.13 (0.82–1.55)
Pregnancy past year	2.62 ^c (1.46–4.72)	2.99 ^c (1.60–5.60)

^aOdds ratios for quantitative data are expressed per unit of the independent variables.

^b $p < 0.05$

^c $p < 0.01$

^d $p < 0.001$

shown that inner-city residents with HIV risk factors are more likely to receive testing than other individuals.⁴⁵ They are also concordant with the LA County Health Survey for 1999, which found that 70% of at-risk heterosexual women had been HIV tested in the past two years.⁴⁶

Our data on predictors of HIV testing are consistent with past research on the general population that has established that having a regular source of care (RSC) is one of the strongest predictors of access to health care services.^{47,48} Our regression model demonstrates the significance of having a RSC, and this is a key variable in our analysis of patterns of HIV testing. LA County homeless women, 61% of whom report having a RSC, fare less well on this measure than do women nationally (86%) and than do other poor adults with an annual family income of less than \$10,000 (72%).⁴⁹ Policies and programs aimed at increasing rates of HIV testing will need to build strategies around providing a regular source of care.

Although we did not analyze RSC as an outcome measure in the current study, prior research on homeless adults in LA County has shown that female sex, older age, non-Medicaid insurance, and poor health are all independent predictors of having a regular source of care in this population.⁵⁰ A Centers for Disease Control and Prevention (CDC) analysis of the National Health Interview Survey also emphasizes that health insurance status is a major determinant of having a regular source of care.⁴⁹ Therefore, our single-outcome analytic model may not adequately assess the indirect impact of additional enabling variables, such as health insurance, on receipt of HIV testing.

Despite this good news, it is alarming that a substantial minority of homeless women with indications for HIV testing have not received this service. For example, 23% who reported a pregnancy in the past year, 26% who had been diagnosed with an STD, and 16% who traded sex had not been tested for HIV in the past year. How can we reach these high-risk groups?

Having a regular source of care clearly plays a pivotal role, but the relative contributions of provider recommendation, special outreach programs, and self-referral are unknown. Further research should investigate patient, provider, and public health influence on patterns of HIV testing. In particular, there is little information on where homeless women are receiving their HIV tests. According to the LA County Health Survey, doctors' offices provided the majority of HIV tests to the County's non-homeless residents. Other reported sites of testing included county clinics, mobile testing units and family planning clinics.⁴⁶ Further research will be needed to identify the key sites where homeless women are receiving HIV testing.

One important limitation of our study is that our data is based on self-report and is thus subject to response bias. Previous work has shown that homeless persons are reliable reporters of their own overall health status but that they may have difficulty reporting complex information or socially undesirable information with great accuracy.⁵¹ Several measures have been shown to improve the accuracy of self-reported data: (1) focusing on recent events; (2) simplifying questions to a single task; (3) allowing respondents to answer at their own pace; and (4) establishing rapport in a non-threatening environment.⁵¹ Each of these measures was taken in the current study. Despite the stigma of HIV infection, three previous studies have shown that inner city residents self-report their HIV serostatus with a high degree of accuracy.⁵²⁻⁵⁴ Unfortunately, there is a paucity of data on the accuracy of self-reported HIV testing. A study of women seeking obstetrical care in a university-affiliated practice demonstrated that only 42% of women who reported having received an HIV test had their reports confirmed. In summary, though the persistent stigma around HIV infection might lead some homeless women to under-report HIV testing, others may over-report HIV testing, because they may wrongly assume that their blood is being tested for HIV when in fact it is being sent for a different test. Whether the net effect creates a response bias or simply generates noisy background is not known.

Another limitation of our study is that, despite a comprehensive theoretical model, our regression model revealed only two statistically significant factors associated with HIV testing in this group of homeless women. Since work in this area is in an early stage, it seems likely that other key variables remain to be identified and added to our model. Lastly, because the sample is drawn from a major metropolitan area, its generalizability to less urban areas may be limited.

Overall, our study, which documents an HIV

seroprevalence of greater than 1%, suggests that providers should offer and encourage HIV testing for all homeless women in LA County. In fact, our data, which show a high rate of testing and few statistically significant independent predictors, also suggest that this may be what is happening in practice. Further research should survey providers to determine what HIV testing guidelines they are actually using. In addition, studies examining the seroprevalence of HIV as well as rates of and indications for HIV testing need to be carried out among homeless women in other areas of the country to formulate the most effective approach to HIV testing for this population.

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