Migration of HIV-Infected Patients to North Carolina: An Emerging Rural Phenomenon

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ABSTRACT

BACKGROUND: Acquired immunodeficiency syndrome (AIDS) has diffused into rural America. Federal funding for AIDS is based upon the number of AIDS cases diagnosed within each state. If HIV-infected patients migrate to other states after diagnosis, health services planning, AIDS prevention and education programs, and federal AIDS funding strategies may need to be altered.

METHODS: We surveyed HIV-infected adult outpatients seen in the University of North Carolina Hospital clinics during four months in 1990. We collected information on sociodemographic and clinical factors, migration patterns, and reasons for moving to the Southeast.

RESULTS: Of 325 respondents, 37 percent thought they had been infected with HIV out-of-state and 20 percent were told they were HIV-infected outside of North Carolina. More than half of our patients (56%) were living in small rural communities. Sixty percent of patients had moved to North Carolina since 1980, sixty-one percent of whom were North Carolina natives. Intravenous drug users were more likely than those in other risk groups to have been diagnosed out-of-state (34% versus 18%, P=0.03). Intravenous drug users, nonwhites, and heterosexual patients were each more likely than either homosexual men, whites, or transfusion recipients to have lived in a Northeastern AIDS epicenter. Reasons cited for moving to North Carolina included social support (88%), health reasons (54%), and better work or educational opportunities (52%).

CONCLUSIONS: Characterizing the migration patterns of HIV-infected patients nationally is crucial for predicting the diffusion of HIV to rural areas, designing AIDS prevention, education, and health service needs, and assessing federal HIV care funding policies.

KEY WORDS: HIV, AIDS, Migration, Diffusion, Epidemiology, Health Services Research

n of HIV-Infected Patients to North Carolina

, 1992, more than 210,000 cases of acquired immunodeficiency
)een reported in the United States, with over 45,500 new cases in
ters for Disease Control (CDC) estimates that 1 to 1.5 million
with the human immunodeficiency virus (HIV).[2]

)f reported AIDS cases has shown that the initial major epicenters
entages of newer cases as the epidemic spreads to other areas of
)ecdotal evidence suggests that persons with AIDS in rural areas
) cities of their initial AIDS diagnosis back to their home towns.
f and reasons for this phenomenon are not known.[4,5,6,7] This
as several important implications. First, migration of HIV-infected
s where additional health care services will be needed. Since the
allocates HIV/AIDS funds based upon the number of AIDS cases
te, the migration of AIDS patients after diagnosis to other states for
t in a maldistribution of Federal HIV funds.[8] With the diffusion of new
an epicenters to more rural areas,[9,10] the health care resources of
y not be adequate to meet the needs of persons with AIDS. Second,
fected persons may serve as a vector for introducing or stimulating
/-infection in rural areas. Third, in-migration may alter the types of
rams needed in rural areas.

Recent studies have found a disproportionately high HIV seroprevalence in the Southern United States among disadvantaged adolescents,[11] migrant farmers[12] and military recruits.[13] In 1989, new AIDS cases in North Carolina increased at three times the national rate.[14] If there is significant in-migration of persons with AIDS to rural, low incidence states such as North Carolina, and if AIDS cases are reported to the CDC without adjustment for migration, then HIV/AIDS prevalence rates will be underestimated.

This study was designed to evaluate the extent to which people infected with HIV who use health services migrate to North Carolina and the reasons why they move. We also determined the movement patterns of HIV-infected patients between urban and rural areas and the implications of these patterns for predicting future needs for medical care, support services, and educational programs in rural areas.

METHODS

This study was conducted from May to September, 1990, at the University of North Carolina (UNC) Hospitals, a 610-bed tertiary care institution located in Chapel Hill, North Carolina. We surveyed all HIV-infected patients over the age of 18 seen in the Infectious Diseases or Hemophilia outpatient clinics, or in the General Clinical Research Center. Information collected included sociodemographic factors (gender, ethnicity, insurance coverage, education, employment status), clinical characteristics (risk behaviors for HIV acquisition, most recent CD4 count), and a ten-year residential history including where people thought they became HIV-infected, the date and location of HIV diagnosis, and factors relating to migration (place of current residence, prior out-of-state residences, reasons for moving to North Carolina). The UNC Committee for the Protection of Human Rights approved this study, and informed consent was obtained from all participants.

Patients were characterized as native to North Carolina if they were born or spent their childhood in, or had family living in North Carolina. Out-of-state migration was defined as travel out of North Carolina for more than a month in the past ten years. Travel to an AIDS epicenter was defined as travel, for more than one month, to one of the 16 metropolitan areas with over 2,000 AIDS cases reported as of November, 1990, the time of study completion.[8]

Patients were asked to rate the importance of each of 12 reasons for having moved to North Carolina on a 4 point Likert-type scale from a "very important" to a "not at all important" reason (See Appendix 1). These reasons were collapsed into four factors which may account for patients' geographic moves: social support reasons, health care reasons, better work or educational opportunities, and duty to care for a friend or family member.

Using CDC criteria,[15] patients were assigned to mutually exclusive risk behavior categories based upon reported HIV risk behaviors, except that hemophiliac patients who had received blood or blood components since 1978 were classified as hemophilia-related cases regardless of their other HIV risk behaviors.

For regional analyses, states were grouped into Northeast, Midwest, West, and South regions as defined by the US Bureau of the Census. Patients' location at the time of presumed HIV infection and patients' current residence were classified as metropolitan or as rural, based upon whether these places were located within a Metropolitan Statistical Area (MSA) as defined in 1986 by the US Office of Management and Budget.[16] MSAs are counties or groups of counties (with the exception of New England, which includes town boundaries) that represent an area with a central city of over 50,000 residents included in an urbanized area of over 100,000 population.[16]

Questionnaires were analyzed using SAS® version 6.06 (SAS Institute, Cary, NC) for statistical relationships between demographic variables and out-of-state migration using chi-square tests and the student T-tests as appropriate.[17] Maps were created using Atlas Mapmaker® (Strategic Mapping, Inc.). The latitude and longitude point coordinates used for mapping and for calculating distances between patients and their families were referenced from the US Geological Survey of Named and Populated Places.[18] Population size of towns where patients were living was obtained from the 1990 Census of Population and Housing.[19]

RESULTS

A. Sociodemographics

Three hundred sixty-four HIV-infected adult outpatients were seen at the University of North Carolina during the study period. Of these, 340 (94%) were approached, and 325 (89%) completed a self-administered survey. Assistance was provided for 8 percent of patients who were unable to read or too ill to complete the survey on their own. The study population was predominantly male (87%), white (62%), and severely immunocompromised (49% with CD4 counts <200)(Table 1). Seventy-two percent of the women were nonwhite as compared with only 33 percent of the men. Half (51%) were gay or bisexual men, 11 percent were intravenous drug users (IVDUs) and 9 percent were gay or bisexual men who also used intravenous drugs. Of the 48 patients (15%) who were infected through receipt of contaminated blood products, 38 were hemophiliacs. Sixty-six percent of the patients who acquired their disease heterosexually and 71 percent of IVDUs were nonwhite as compared with only 26 percent of the gay men and gay IVDUs.

Eighty-two percent of the study population had at least a high school education. Overall, the men had more years of schooling than the women (13.2 versus 12.0, P=.003), white patients had more than nonwhite patients (13.4 versus 12.5, P=.002), and gay men had more than patients in other risk group categories (13.8 versus 12.3, P<.001).

Seventy-one percent of our patients had health insurance: forty-two percent of patients were covered by a private health plan or a Health Maintenance Organization (HMO), and 29 percent by Medicaid or Medicare. There was no significant difference in the percentage of patients with any health insurance within different risk behavior categories. However, 53 percent of IVDUs and only 14 percent of gay men were insured by Medicaid.

Women were also 2.5 times more likely than men to be on Medicaid (50% versus 20%). About half of the patients (48%) were unemployed and 41 percent worked full-time.

B. Geographic and Migration Patterns

Most patients resided in North Carolina (96%), and 32 percent lived in rural counties (Figure 1). The true impact of HIV infected persons in rural areas was assessed by examining the size of community in which individuals live. Over half (56%) of all HIV-infected patients lived in towns of less than 50,000 population, since some patients live in small towns incorporated within counties designated as metropolitan (Table 1).

Sixty percent (N=194) of study patients had lived outside of North Carolina for more than one month in the past 10 years. Thirty-seven percent (N=114) thought they had been infected with HIV outside of North Carolina and 20 percent (N=64) had actually been tested and told they were HIV-infected out-of-state. Figure 2 illustrates where patients were living when they thought they became infected with HIV. Intravenous drug users were twice as likely as those in other risk groups to have been told they were HIV-infected out-of-state (34.4% versus 18.0%, P=0.03). Out-of-state travellers were most likely to report recent travel to New York City, New Jersey, Atlanta, Miami, San Francisco, Los Angeles and Baltimore.

Seventy-six percent of study patients were North Carolina natives. Of those who had lived out-of-state before moving to North Carolina, almost two thirds (61%) were returning natives. These returning natives were no more likely than the population as a whole to have received their HIV diagnosis out-of-state (22% versus 20%, P=0.68).

Out-of-state migration varied by patients' HIV risk behavior category, but not by gender, ethnicity, insurance status or CD4 count (See Table 2). Intravenous drug users were most likely to have travelled out-of-state (77%). Intravenous drug users, gay IVDUs and patients who acquired their disease heterosexually were more likely to have lived in an AIDS epicenter (77%, 79% and 71% respectively) than those patients in the other risk behavior groups (55%, P=0.03). Intravenous drug users and patients who acquired their disease heterosexually were more likely to have travelled to a Northeastern AIDS epicenter (65% and 67% respectively) than patients in other risk behavior categories who had travelled (20%, P<0.001). Gay men and gay IVDUs were more likely to have travelled to an AIDS epicenter in the Midwestern or Western region of the country than patients in other risk behavior groups (18% and 32% respectively, versus 4%, P=0.03). White patients were more likely than nonwhite patients to have travelled to Midwestern or Western epicenters (81% versus 19%, P=0.036), and nonwhite patients were more likely than white patients to have travelled to Northeastern epicenters (57% versus 43%, P<0.001).

The migration patterns of HIV-infected persons between metropolitan and rural counties are reported in Table 3. Most of our patients (62%) thought they had been infected in metropolitan areas and were living in metropolitan counties at the time of this survey. However, of the 17 percent of patients who thought they were infected in metropolitan counties but were currently living in rural counties, over half were North Carolina natives who had returned home. Furthermore, 63 percent of this subgroup were living out-of-state at the time when they think they became HIV-infected (data not shown). Although over 90 percent of the IVDUs thought they had been infected with HIV in metropolitan areas, only 59 percent were currently living in a metropolitan county.

C. Reasons for Migration

Eighty-eight percent of the patients who had lived out-of-state said that they had migrated to North Carolina for better social support reasons and 65 percent moved to be near family. Health reasons and better work or educational opportunities were cited as important by 54 percent and 52 percent of patients, respectively. Only 18 percent of patients cited a duty to care for an ill friend or family member as an important determinant for their moving to North Carolina.

Reasons for migrating to North Carolina varied by HIV risk behavior category. Intravenous drug users were more likely to move for social support, health and lifestyle reasons (92%, 69%, and 69%, respectively), whereas gay or bisexual men primarily cited as important social support or health reasons, or better work or educational opportunities (89%, 54% and 54% respectively). There was no difference in mean CD4 counts for patients who moved for social support or lifestyle reasons, or for better work or school. However, there was a trend toward lower CD4 counts in patients returning for health reasons (204 versus 256, P=0.081) or to be near their families (208 versus 263, P=0.068).

Since social support factors (including to be near family) were important determinants of why out-of-state travellers moved to North Carolina, we quantified the potential importance of familial support by graphing the distance between the current residences of patients and their families. A zero distance indicates that a person lives in the same town as their family member. Gay men (71%), IVDUs (70%), and people who acquired their disease heterosexually (70%) had equal proportions of family living in North Carolina. Among IVDUs and people who acquired their disease heterosexually who had family living in North Carolina (N=47), 87 percent lived in the same town as a relative and 98 percent

lived within 20 miles of a family member. In contrast, 58 percent of gay men lived in the same North Carolina town as their family, and only 61 percent lived within 20 miles.

DISCUSSION

AIDS has become an increasingly important problem in the small towns and rural areas of America.[14,20] In 1981, as the first AIDS cases were being reported, 76 percent were from New York or California.[3] By the end of the first decade of AIDS, over 43,000 cases were reported from all 50 states in 1991 alone, and nearly two thirds were from outside New York and California.[1] Understanding geographic migration patterns of HIV-infected people is important in order to predict more accurately the future spread of HIV into rural areas and to evaluate the need for health services and educational programs targeting specific populations.

Our data support the hypothesis that many HIV-infected patients have moved away from their native areas, and are migrating back home and subsequently seeking health services in lower prevalence areas, such as North Carolina. However, although the majority of our patients may have been infected out-of-state and returned HIV-infected, 40 percent had never lived out-of-state for more than a month during that past decade and were, thus, presumably infected in North Carolina. Gay men were least likely to have travelled to an HIV epicenter if they travelled out of North Carolina and, thus, they may be more likely than patients with other AIDS risk behaviors to have been HIV infected in North Carolina. This underscores the importance of including rural areas in public health interventions to stop the spread of HIV and to educate the public about the nature of the epidemic. Rural residents need to appreciate that AIDS is not a problem unique to urban areas; people who engage in high risk behaviors may become infected with HIV without ever leaving their rural hometown.

Unfortunately, persons outside of the AIDS epicenters less often adopt safer sex and needle practices.[21,22] Factors which may explain this phenomenon include: insufficient

access to education about risk reduction, lack of perceived personal vulnerability to AIDS, decreased contact with persons who already have AIDS, and inadequate reinforcement and peer support encouraging safer behaviors.[21,22] However, since the prevalence of HIV infection is likely to be lower in rural areas, prevention efforts in these rural areas may have a greater impact in limiting the proportion of the population that may ultimately become infected.

The study findings have implications for the delivery of accessible, quality HIV-related health services in lower prevalence areas. Rural hospitals frequently do not have the resources, the professional ability, or the willingness to manage HIV disease.[20] Nationally, AIDS accounts for 28 percent of the costs and 36 percent of the financial losses of public hospitals.[23] In 1991, the estimated cost of treating a person with AIDS was $85,000, and $5.8 billion dollars for all HIV-infected people, with a projected increase up to $10.4 billion by 1994.[24]

What is not clear is who will be paying the bill for caring for HIV-infected patients. With the changing profile of the HIV epidemic, fewer HIV-infected patients are going to be insured by private companies. One-fifth of the patients in our study were diagnosed with HIV out-of-state, and 73 percent of those diagnosed out-of-state returned to North Carolina for health reasons. Titles 1 and 2 of the Ryan White Comprehensive AIDS Resources Emergency Act (CARE) of 1990 attempt to improve the quality and availability of HIV care by providing financial assistance to the cities and states with the largest numbers of AIDS cases reported to the Centers for Disease Control.[8] However, a significant proportion of HIV-infected patients migrate out of the area where they are diagnosed and seek health services in other areas. If federal figures underestimate the number of HIV-infected patients needing health care by 20 percent, this may threaten the ability of a state's health care system to provide services for these patients. If an equitable distribution of AIDS-

related funds is to be maintained, additional research must fully address the inter-state migration of persons with AIDS and its impact on allocation of federal AIDS health care funding.

This study is a step toward developing methods for exploring the migration of HIV-infected people and the implications of this movement for transmission, education, and HIV/AIDS patient care funding. However, this study was limited in several ways. The study population was drawn from one state-supported referral medical center with specialized AIDS services and may not be representative of all HIV-infected patients. The questionnaire measured migration as travel out of North Carolina for more than a month, based on the assumption that the longer someone lives in an area, the higher their likelihood of coming in contact with HIV. Unfortunately, time did not allow us to determine patients' risk for becoming HIV-infected during shorter out-of-state trips. Additionally, we were not able to assess out-migration, i.e., the percentage of patients leaving North Carolina to seek care in other states.

Migration issues are important in predicting HIV spread and AIDS health service needs. By understanding the migration across jurisdictional borders and between urban and rural areas, we may improve our ability to design specific AIDS prevention and education programs for vulnerable populations in low prevalence rural areas. Fully characterizing the migration patterns of HIV-infected patients is a crucial step in predicting the impact of HIV on rural areas and in modifying federal HIV care funding policies to care more adequately for people with HIV/AIDS.

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APPENDIX 1: Reasons for moving to North Carolina

To be near family

To be near friends

For better work opportunities

For better educational opportunities

For better or more personalized health care

For better support networks

To change lifestyle (move away from areas where "risky" behaviors occurred)

To care for an ill family member

To care for an ill friend

For help with finances

For help with caring for your HIV disease

Figure 1: Distribution of where patients were living when they think they became infected with HIV. N = 309.

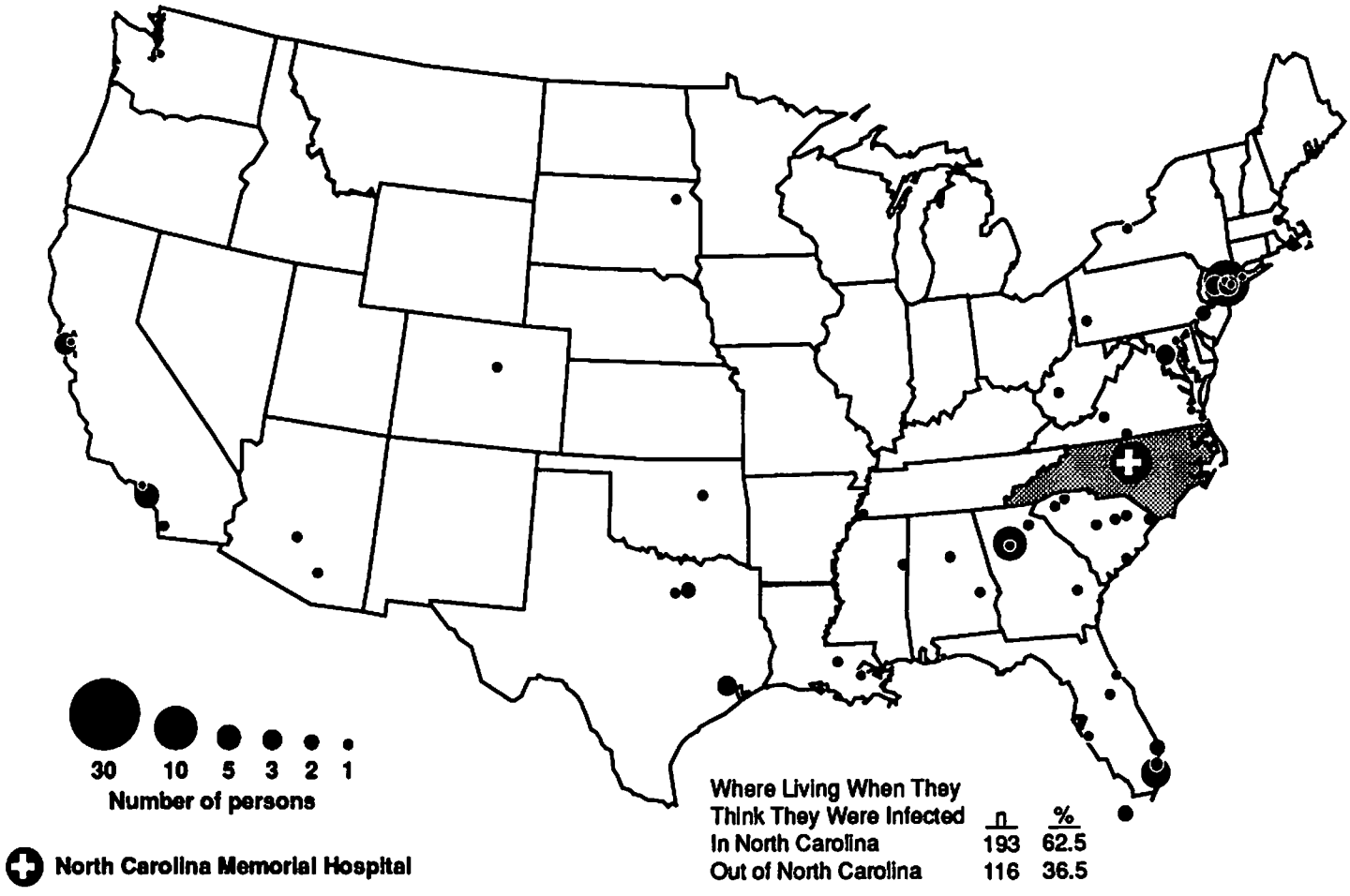

Figure 2: Distribution within North Carolina by county of residence of HIV-infected patients treated at University of North Carolina Hospital clinics. Dots are distributed randomly within county boundaries. N = 312.

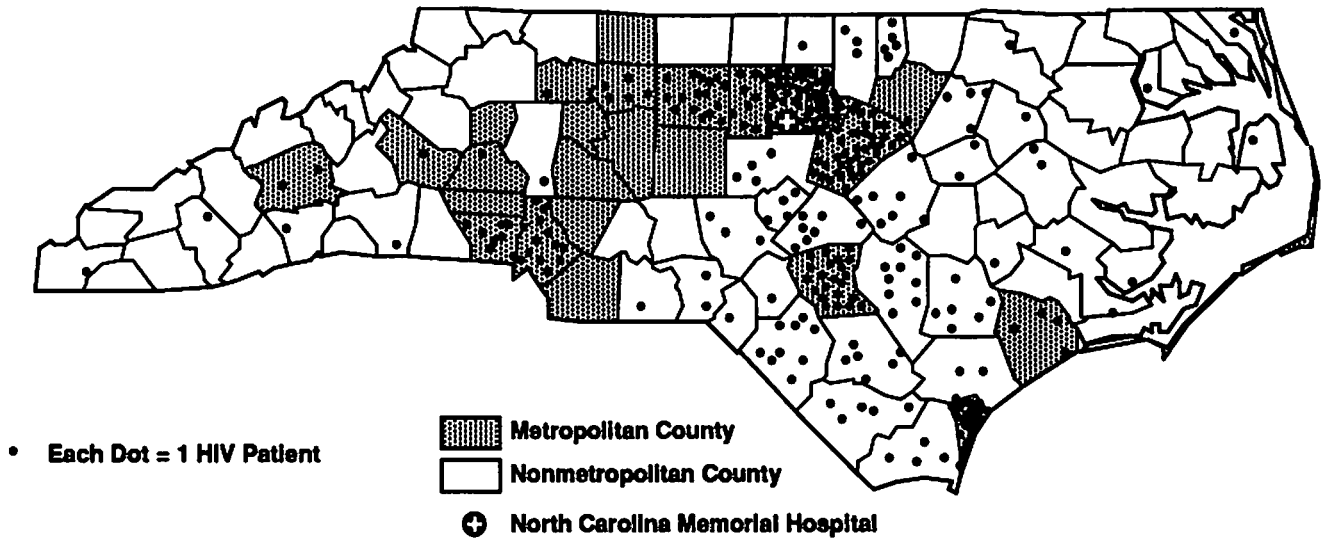

TABLE 1: Sociodemographic Characteristics of Study Patients (N=325)

Patient Characteristics	%	N
Gender		
Male	86.8	282
Nonwhite	33.3	94
Female	13.2	43
Nonwhite	72.1	31
Race		
White	61.5	200
Black	32.6	106
Hispanic	1.5	5
Other	4.4	14
Total Non-white	38.5	125
Risk Behavior Category		
Gay Male	50.8	165
Intravenous Drug User (IVDU)	10.5	34
Both IVDU and Gay Male	9.2	30
Heterosexual	11.7	38
Transfusion	14.8	48
None	3.0	10
Education		
< High School	18.3	59
High School	38.1	123
> High School	43.6	141

TABLE 1: Sociodemographic Characteristics of Study Patients (N=325) (Pg. 2)

Patient Characteristics	%	N
Employment (N=324)		
Full-Time	40.7	132
Part-Time	10.8	35
None	48.5	157
Insurance (N=323)		
Government-Assisted/Public	29.2	94
Private/HMO	41.6	134
None	29.2	95
CD4 Lymphocyte Count (N=314)		
0-49	26.1	82
50-199	22.6	71
200-499	42.4	133
>500	8.9	28
Population size of Town of Residence		
Less than 10,000	34.8	113
10,000-50,000	20.9	68
More than 50,000	44.3	144

TABLE 2: Out-of-State Migration by HIV Risk Behavior Category

Risk Behavior	Percent Lived Out of State	Percent Lived in an AIDS Epicenter			
		West/ Midwest	Northeast	Southern	Any Epicenter
Gay Male	61.2	17.8	13.9	31.7	52.5
IVDU	76.5	3.9	65.4	19.2	76.9
Both IVDU & Gay Male	63.3	31.6	36.8	36.8	79.0
Heterosexual	55.2	4.8	66.7	14.3	71.4
Transfusion	47.9	4.4	34.8	34.8	69.6
None	40.0	0.0	25.0	0.0	25.0

TABLE 3: Migration of HIV-Infected Persons Between Metropolitan and Rural Counties*

Where HIV Infected	Where Surveyed	%	N
Metropolitan	Metropolitan	62	187
Metropolitan	Rural	17	53
Rural	Rural	16	48
Rural	Metropolitan	5	16
Total		100%	304

*Column 1 depicts type of county patients were living in when they think they became infected with HIV, and Column 2 depicts type of county patients were living in when they completed the survey.