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# Gender Differences in Neighborhood Service Use

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**C.H.A.I.N. REPORT**

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## KEY FINDING

- C Gender differences were not significant in perceived knowledge of finding HIV services, though MSM had significantly more knowledge in terms of finding HIV services than women and heterosexual men.
- C Women used information from personal social networks the least, MSM the most. Among referral sources, women most often used information from medical professionals, while both male groups, MSM and heterosexual men, most often used sources from friends or relatives.
- C Women were less likely to be aware of neighborhood medical care providers than men and women were also significantly less likely to use or be willing to use neighborhood services than men.
- C There was no significant difference among the three gender groups in mean distance from their residential places to primary medical providers. However, gender became a strong predictor in multivariate regression analyses, after controlling other factors. Being MSM was related to an increase in distance, even though a higher proportion of MSM lived in Manhattan than heterosexual men and women. The distance became greater by time largely due to respondents changing their primary doctor to one in a voluntary hospital or to a private doctor.
- C The distance to case management service providers differed by gender. The mean distance for MSM was significantly less than that for women and heterosexual men, mainly due to the fact that more women and heterosexual men used NYCHRA as their primary case managers. Women's mean distance to case managers was not significantly different from men's, even though more women lived outside Manhattan and more women were Black or Hispanic, which were significant factors to increase the distance to case managers. Women's low educational level and higher poverty level, which were significant factors to decrease the distance in multivariate analyses, were probably the reasons in keeping their mean distance similar to that of men's.
- C In sum, the distances to service providers among three groups were not significantly different. However, women were less knowledgeable and reported fewer informational resources of HIV services than both heterosexual men and MSM. Also, women had significantly lower willingness to use neighborhood services.

## INTRODUCTION

Scholars whose interest lies in the influence of neighborhood factors on individual health suggest that the study of public health is essentially ecological -- relating environmental and neighborhood characteristics to health. Using multilevel and contextual analyses, studies have shown that the socioeconomic status of a neighborhood is significantly related to an individual's health, independent of the individual's own socioeconomic status. Studies have also found that spatially and socially structured factors such as a neighborhood's education system, crime level, housing quality, accessibility of health-related information and resources are all crucial factors in determining the health of an individual (Stafford et al., 2001; Subramanian et al., 2001).

Historically, women have been seen as the basis for providing neighborhood relationships. It has been shown that women, due to their domestic responsibilities, even with growing female participation in the labor market, are more likely to spend their time in their neighborhoods, while men have greater job-based social lives (McPherson and Smith-Lovin, 1982; Campbell and Lee, 1992).

The nature and content of female neighborhood relationships may bring about greater awareness and utilization of neighborhood-based services among women. The relatively longer time in outside of residential place men spend, however, might be advantageous in facilitating the use of a broad range of service organizations by men. These different patterns of neighborhood involvement for men and women have potentially important implications for social control of neighborhood service use. Women might be more influenced by community-based control because of their extensive relationships in their neighborhoods. Social control in neighborhoods may constrain or encourage people's access and use of needed services.

Several studies on health service use show that HIV positive women use fewer health services than men, while women in the general population tend to use more. In previous studies, women with HIV received fewer medical care services than men with HIV (Hellinger, 1993; Butz et al., 1993), women used fewer outpatient services than men, and as a result were more likely to depend on emergency room use (Mor et al., 1992), women more skeptical than men about new antiretrovirals and less likely to use (McDonald et al., 2001); and fewer women use HAART than men because of women's special barriers and stressors including childcare, housing, and financial pressures (Women's Inter-Agency HIV Study, 2002). The burden of poverty and motherhood experienced by women has been cited as to why women are less apt to use appropriate health services. The majority of women with HIV/AIDS belong to socially and economically disadvantaged groups that have a variety of needs. However, women have limited access to existing resources because of their lack of information, knowledge, and time, as well as the burdens of being caregivers and living in poverty.

The previous CHAIN reports showed that men have fewer service gaps than women (CHAIN Report 2005-3, CHAIN Report 2004-1). Men are less likely than women to experience service gaps in treatment adherence, comprehensive case management, and counseling case management. However, there is no study to explain the mechanism or the reason yet. This study investigates the patterns of neighborhood service utilization with gender perspectives: how to find out their service providers, how to feel about using neighborhood services, and how far to go to get the services. This study investigates if women have less knowledgeable and fewer informational resources about existing services. This study also examines if women are less likely to use or willing to use neighborhood services than men, so go further to get the services,

due to that fact that women spend more time in the neighborhoods and have more close neighbors, so concern more about the neighbors than men.

To investigate gender differences in neighborhood service use, this study asks these questions;

- Do women have different informational resources to find out their service providers?
- Are there gender differences in the level of knowledge to find service providers?
- Are there gender differences in willingness of using neighborhood services providers?
- Are there gender differences in the distance to services providers?

## **DATA**

### CHAIN survey data

The CHAIN study includes 968 individuals who were interviewed at least once during 1994-2002. Among them, 19 individuals, 6 women and 13 men, who were staying in residential treatment facilities at the time of interview, such as nursing homes and drug treatment institutes, were excluded from the analysis, since this study investigates health service utilization.

Health service use is not fixed or constant, but rather changes over time. Each wave's information about service use has been collected from every eight waves. In this study, therefore, the survey information for all eight waves of the original cohort and three waves of the refresher cohort (Sample=949, and interview cases=4,075) was used to measure health service utilities and the distances between residences and service facilities. Among respondents, 383 were women and 566 were men. Men were divided into two groups, heterosexual men and men who have sex with men (MSM), since many studies have shown differences in various aspects. Among 566 men, 268 were categorized as men who have had sex with men.<sup>1</sup>

### CHAIN Service Agency Database

The service agency database was initially created for the sampling frame in 1994, and additional agencies and providers were added with CHAIN respondents' reports of service utilization. There were a total of 3,444 records in the CHAIN agency database as of June 2003. Thirty-four percent of the entries (1,172) were individual providers, most of which were private medical doctors and dentists. Twenty-four percent of the agencies (832) were social service agencies, while 18% (615) were hospitals or community health clinics. There were 218 drug treatment program entries (6%) and 91 nursing home, hospice, or home care providers (3%). Eighty-three prison or correctional facilities (2%) were also listed. Two hundred thirty-seven agencies were not categorized by agency types, since they were not located in New York City. In general, this database contained a comprehensive listing of medical and social service agencies for people with HIV/AIDS living in New York City, including every Ryan White-funded agency.

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<sup>1</sup> Eleven men who had 1-2 male partners during their life but didn't have sex with men during the study period and identified themselves as heterosexuals were consistently excluded from the category of men who have sex with men, and included in the category of heterosexual men.

## MEASURES

### Information of HIV service providers

Informational sources of HIV services were measured in two categories; ‘perceived knowledge of HIV services’ and ‘informational sources of service providers’. In all eight rounds of interviews, the level of perceived knowledge in regards to finding HIV services was measured by three survey questions asking how respondents feel about access to information on HIV services. Answers were categorized as strongly agree, agree, disagree and strongly disagree. Among these, “strongly agree” and “agree” were considered as expressions of positive opinion.

- Measure of ‘perceived knowledge of HIV services’

| Variables                           | Used CHAIN Questions  | Choices   |
|-------------------------------------|---|---|
| Knowledge of HIV services           | “I <b>know</b> where to turn for help with HIV”                           | strongly agree,<br>agree,<br>disagree,<br>strongly disagree |
| Personnel for finding HIV services  | “There are <b>people</b> I can turn for <b>help to find</b> HIV services” |   |
| Capability for finding HIV services | “I know <b>how to find</b> the services that I need to help me”           |   |

There were three questions to ask how to find their service providers; primary medical provider; mental health professional service providers, and substance abuse treatment service providers. Most providers refer to other services either by request or need, and most respondents had persons who knew their HIV status and/or friends who were HIV positive. Thus the respondents, as service users, gathered all available information from their own knowledge, other professionals or their social network to find available services and choose service providers. It is reasonable to say that most respondents chose or found their service providers through their own will or judgment, as only a few people, about 2%, answered that they go to their current provider without any particular reason (for example, some answered, “I was just taken there” or “I was there for something else”), and most respondents, about 85%, felt that they had an ample number of choices in selecting their medical providers (data not shown). Since the questions about finding HIV services were added during the fifth round of interviews, only the last four rounds of interviews were used in this analysis.

- Measure of ‘informational sources of service providers’

| Used CHAIN Questions  | Choices  |
|---|--|
| “Thinking back to the first time you went [your primary medical provider, mental health provider, drug/alcohol service provider]. Did you go on your own or did someone refer to you or tell you go there?”<br>“If referred, who referred you to this place?” | On my own ;<br>Friend or relatives ;<br>Another medical provider (including mental health or drug/alcohol service provider); Case manager; Other |

Willingness of neighborhood service use

During the fourth to sixth rounds of interviews, respondents were asked if their neighborhood/community contains medical providers, and if it does whether she/he uses them. When respondents answered that they were not aware of any HIV/AIDS service providers in their neighborhoods, they were also asked if they would prefer to receive services where they live.

- Use and willingness to use neighborhood services

| Used CHAIN Questions   | Choices  |
|--|--|
| “As far as you know, are there (medical care, case management) services for persons with HIV/AIDS in the neighborhood where you now live?” | 1. Yes, and I use them.<br>2. Yes, but I do not use them.<br>3. I am not aware of any.   |
| “[If you are not aware of any], would you prefer to get (medical care, case management) services in the neighborhood where you live?”      | 1. Yes, I prefer to get services there.<br>2. No, I prefer not to get services there.<br>3. It really doesn't matter to me where services are located. |

Distances to service providers**Table 1. Geocoding Process of Participants' Residential Places**

| Geocoding Result of Addresses            | Total addresses<br>(N =1,701)   | %   |
|--|---------------------------------|-----|
| Geocoded                                 | 1,634                           | 96% |
| Homeless                                 | 13                              | <1% |
| Duplicated wave                          | 12                              | <1% |
| Outside of NYC or P.O.BOX                | 17                              | 1%  |
| Updated after study period               | 25                              | 2%  |
| Borough of Geocoded addresses            | Geocoded addresses<br>(N=1,634) | %   |
| Manhattan                                | 457                             | 28% |
| Bronx                                    | 565                             | 35% |
| Brooklyn                                 | 365                             | 22% |
| Queens                                   | 139                             | 9%  |
| Staten Island                            | 108                             | 7%  |
| Geocoded address numbers per each person | Study participants<br>(N =949)  | %   |
| 1 record                                 | 535                             | 56% |
| 2 records                                | 231                             | 24% |
| 3 or more records                        | 170                             | 18% |
| 0 (homeless)                             | 13                              | 1%  |

Residents' address files contained a total of 1,701 records of address information with 949 individuals during eight rounds of interviews (Table 1). Among all information, 1,634

records (96%) were successfully geocoded, while 67 records (4%) were not able to be geocoded with the following reasons; 13 participants were recorded as “homeless” or “homeless in Bronx,” 12 records were dropped because the entry date was further from the interview date than other records, 17 records (1%) were outside the realm of New York City or P.O. Box information, and 25 records (2%) were updated after the last interview for future study purpose. Among 949 study participants, 56% had only one address and 18% (170) had three or more addresses during the study period. Distribution of boroughs is also listed in Table 1.

Service agencies were also geocoded (Table 2). Agency data files included 3,444 service agencies as of June, 2003. Among them, 2,767 agencies in New York City were selected to be geocoded and 473 (17%) service agencies were excluded because they were not located in New York City. Most agencies outside New York City were located in Long Island, New Jersey and upstate New York.

Among the 2,767 service agencies selected, 2,294 (83%) were successfully geocoded. 17% (473) of agencies couldn't be geocoded, because of limited address information (405 agencies), or use of generic service categories with no specific location information (61 agencies, with descriptions such as “physician in Bronx” or “methadone program”), or because the agencies were mobile with no permanent address (6 agencies).

**Table 2. Geocoding Process of the Site of Service Providers**

| Agency Database                             | Agency           | %             |
|---|------------------|---------------|
| <b>Site of Service agencies</b>             | <b>(N=3,444)</b> | <b>(100%)</b> |
| In New York City                            | 2,767            | 83%           |
| Out of New York City                        | 473              | 17%           |
| <b>Included agency in geocoding process</b> | <b>(N=2,767)</b> | <b>(100%)</b> |
| Geocoded                                    | 2,294            | 83%           |
| No address information entered              | 405              | 15%           |
| Used as a general code                      | 61               | 2%            |
| Mobile agency without permanent address     | 6                | <1%           |

Next, every service agency reported by a participant to have given services during the study period was recorded and saved into either the health service category or the social service category. A total of 12,514 medical service agencies and 5,532 social service agencies were recorded. Among all used service agencies, the addresses of 92% of health service agencies (11,501) and 91% of social service agencies (5,035) were geocoded (Table 3). There was no statistically significant gender difference in the geocoding status of agencies, though men used more private service providers that could not be geocoded than women (data not shown).

**Table 3. Geocoding Status of Service Agencies used by CHAIN Respondents**

| Agencies ever used by any participant | Medical service agencies |     | Social service agencies |     |
|---------------------------------------|--------------------------|-----|-------------------------|-----|
|                                       | N (12,514)               | (%) | N (5532)                | (%) |
| Geocoded agencies                     | 11,501                   | 92% | 5,035                   | 91% |
| No address information                | 346                      | 3%  | 261                     | 5%  |
| Used as a general code                | 465                      | 4%  | 202                     | 4%  |
| Outside of New York City              | 202                      | 2%  | 34                      | <1% |

The Geographic Information Systems (GIS) method using the ArcGIS program and shape file of street maps (lionstreets10405.shp) developed by the New York City government has been used to geocode both service agencies and participants' residential places. Since New York City is not a geographically huge area and roads and streets are connected closely, it was not necessary to consider the height of ground level nor to calculate distances to street connections, which are often required to measure distance more precisely. Distances were calculated with units of feet, and these calculations were then transferred into miles (1 mile = 5,280 feet).

#### Control variables for regression analyses

Since medical and social service utilization is assumed to be related to the amount of people's need, respondents' health status, HIV risk group, and socio-economic status were used as control variables, along with basic socio-demographic variables.

T-Cell counts, perceived health status, MCS (Mental health Component Scale) score by MOS SF-36, and self-efficacy score were used to control for medical and other treatment needs. Housing status, educational level and household income level were used to control socioeconomic status. Risk group associated with getting HIV was an important collective factor in influencing daily lives of people with HIV/AIDS.

Being gay or an injecting drug user or a frequent drug user not only carried a lot of stigma, but led people to cultivate relationships within these groups, which perhaps provided interpersonal paths of information or shared support. Demographic characteristics such as gender, race/ethnicity and age were used as control variables. The newly diagnosed person as PLWHA and the time of interview were included in regression analyses to determine whether there is a different pattern of health service use for the newly diagnosed group, or for those who interviewed more recently. Since the CHAIN project is a longitudinal study, the recent interview means a longer period of study participation as well as a longer period of living with HIV/AIDS. The time of interview is indicated with the number of interview round among eight rounds of the CHAIN interviews.

#### Statistical Analysis

To measure neighborhood health service utilizations and informational sources of HIV services, Chi square, t test, Pearson correlation, analysis of variance (ANOVA), and multivariate regression were used. Since this study includes multiple rounds of interviews with the same persons, the cross sectional time-series regression model was applied to adjust standard errors of the estimates of the regression coefficients to account for the dependency among multiple observations contributed by the same individual. Generalized estimation equation using population averaged panel data model was chosen for this study rather than random effect model, because population averaged model leads more valid and robust inferences, especially when the distribution of standard error of coefficient is uncertain to have normal distribution.

All results of regression were displayed with the exponential coefficients and corresponding confidence intervals. Linear regression with normal distribution has exponentiated coefficient and logistic regression with binomial distribution has exponential odd ratios (OR). For linear regression with Poisson distribution, the incident rate ratio (IRR), the rate at which events occur, reports estimated coefficients transformed to incidence-rate ratios, that is,  $e^{\beta_i}$ , rather than  $\beta_i$ .

Geographical information system (GIS) was used to identify respondents' residential location into census tract and to measure the distance between residential places and service agencies. Neighborhood information based on census tract and zip code was merged into individual survey information, using the GIS geocoding process.

All statistical analysis will be done with STATA version 8.0, ArcView version 3.2, and ArcGIS version 8.1.

## RESULT

### 1. Gender differences in information of HIV services

Table 4 demonstrates perceived knowledge of access to HIV services by gender. The majority of respondents answered that they strongly agree or agree that they had enough sources to obtain information on HIV services, i.e., that they had knowledge of, personnel to help them find, and capability to find HIV services. Gender differences were significant in terms of knowledge of HIV services, but not for personnel and capability of finding HIV services. In general, MSM were more likely to have knowledge of HIV services than women and heterosexual men. More MSM expressed strong opinions than the other two groups, especially heterosexual men. Twenty-nine percent of MSM, compared to 13% of heterosexual men and 20% of women strongly agreed that they had knowledge of HIV services (data not shown). Seventy-five percent of women, 74% of heterosexual men, and 79% of MSM agreed or strongly agreed that they had knowledge of, personnel to help them find and the capability to find HIV services.

**Table 4. Perceived Knowledge for finding HIV Services**

| Variables                              | All<br>(N= 4,005) | Female<br>(1,655) | Heterosexual men<br>(1,142) | MSM<br>(1,208) | P-value |
|--|-------------------|-------------------|-----------------------------|----------------|---------|
| Having Knowledge of HIV services       | 84%               | 83%               | 83%                         | 86%            | 0.035   |
| Having People for finding HIV services | 93%               | 93%               | 94%                         | 92%            | 0.338   |
| Capable of finding HIV services        | 90%               | 89%               | 90%                         | 91%            | 0.239   |
| All three answers                      | 76%               | 75%               | 74%                         | 79%            | 0.005   |

Next, what information respondents actually used to find their service providers was investigated. Most providers refer other services either by request or need, and most respondents had persons who knew their HIV status and/or friends who were HIV positive. Thus the respondents, as service users, gathered all available information from their own knowledge, other professionals or their social network to find available services and choose service providers. It is reasonable to say that most respondents chose or found their service providers through their own will or judgment, as only a few people, about 2%, answered that they go to their current provider without any particular reason (for example, some answered, "I was just taken there" or "I was there for something else"), and most respondents, about 85%, felt that they had an ample number of choices in selecting their medical providers (data not shown). Since the questions about finding HIV services were added during the fifth round of interviews, only the last four rounds of interviews were used in this analysis.

Table 5 presents gender differences in informational resources for HIV services. The results show that many respondents did not use information from others and instead found service providers themselves. “Myself” was the most frequently used answer for all three areas of service providers, followed by “friends, relatives, or acquaintances” and “another medical provider.” Among the three service areas, mental health service was the only area in which respondents used information from other professionals more than their own knowledge.

Among the three gender groups, women used information from other sources the least, MSM the most. Among referral sources, women most often used information from medical professionals, while both male groups most often used sources from their social network. Especially, heterosexual men used more informational sources from others than women, even though previous finding says that heterosexual men had significantly lower level of perceived capability for having people who can help to find HIV services than women. Amongst women, 46% found their primary medical doctor on their own and 24% used a referral from another medical professional. Only 16% of women used information from their social network, compared to 26% of heterosexual men and 27% of MSM. For drug/alcohol treatment, the difference in terms of social network use was even greater. Among those who used drug/ alcohol treatment services, 36% of MSM and 18% of heterosexual men found their services through information from their social network, while only 8% of women did.

**Table 5. Informational Sources to find HIV Services<sup>1</sup>**

| Variables                               | All       | Heterosexual men |       |       | P-value |
|---|-----------|------------------|-------|-------|---------|
|   |           | Female           | MSM   | MSM   |         |
| <b>Primary medical provider</b>         | (n=1,868) | (833)            | (523) | (512) | 0.000   |
| Myself                                  | 42%       | 46%              | 41%   | 36%   |         |
| Referred by social network              | 22%       | 16%              | 26%   | 28%   |         |
| Referred by medical provider            | 20%       | 24%              | 17%   | 17%   |         |
| Referred by case manager                | 8%        | 7%               | 8%    | 8%    |         |
| Other                                   | 8%        | 7%               | 8%    | 11%   |         |
| <b>Mental health provider</b>           | (n=476)   | (181)            | (102) | (193) | 0.219   |
| Myself                                  | 29%       | 30%              | 29%   | 27%   |         |
| Referred by social network              | 11%       | 9%               | 13%   | 12%   |         |
| Referred by medical provider            | 29%       | 34%              | 24%   | 27%   |         |
| Referred by case manager                | 15%       | 14%              | 20%   | 12%   |         |
| Other                                   | 17%       | 13%              | 15%   | 22%   |         |
| <b>Drug/alcohol treatment service</b>   | (n=267)   | (107)            | (107) | (53)  | 0.000   |
| Myself                                  | 54%       | 64%              | 55%   | 34%   |         |
| Referred by social network              | 18%       | 8%               | 18%   | 36%   |         |
| Referred by medical provider            | 8%        | 7%               | 11%   | 4%    |         |
| Referred by case manager                | 9%        | 7%               | 7%    | 15%   |         |
| Other                                   | 12%       | 15%              | 8%    | 11%   |         |
| <b>Any Referral from social network</b> | (n=1,868) | (833)            | (523) | (512) | 0.000   |
|   | 25%       | 18%              | 29%   | 31%   |         |

<sup>1</sup> This question was asked only of respondents who were using services at the time of the interview. This question was asked only from the fifth round of interviews.

In ethnic group comparison, black and “other” ethnic group had higher rates of “my own” than white and Hispanic. Interestingly, Hispanics, who had significantly lower level of knowledge and informational sources to find HIV services than other ethnic groups, used referred information from their interpersonal networks as much as whites, who had the highest

level of perceived availability. Another interesting finding is the distribution of informational sources by time. The proportion of people who depend on their own judgement to find service providers was significantly higher among recent interviews than old ones (data not shown).

**Table 6. Regression Analyses of Knowledge and Informational resource from social network for finding HIV services<sup>1</sup>**

| Factors                                 | Knowledge for finding HIV services |              | Informational resource from social networks for finding HIV services <sup>2</sup> |              |
|---|------------------------------------|--------------|---|--------------|
|   | OR                                 | 95% CI       | OR  | 95% CI       |
| <b>Gender</b>                           |                                    |              |   |              |
| Heterosexual male (vs. women)           | 0.96                               | (0.77, 1.21) | 1.81***   | (1.31, 2.49) |
| MSM (vs. women)                         | 1.03                               | (0.80, 1.36) | 1.69***   | (1.19, 2.39) |
| <b>Socioeconomic Characteristics</b>    |                                    |              |   |              |
| Age                                     | 1.00                               | (0.99, 1.01) | 0.99  | (0.97, 1.01) |
| Black (vs. White/other)                 | 0.82                               | (0.60, 1.12) | 0.70+   | (0.47, 1.04) |
| Hispanic (vs. White/other)              | 0.85                               | (0.61, 1.20) | 0.87  | (0.56, 1.36) |
| Did not graduate high school            | 0.75**                             | (0.61, 0.92) | 1.02  | (0.77, 1.35) |
| Household Income <\$7500 a year         | 0.92                               | (0.78, 1.08) | 0.99  | (0.78, 1.25) |
| Unstable Housing                        | 0.90                               | (0.71, 1.14) | 1.05  | (0.72, 1.53) |
| Homeless                                | 0.67**                             | (0.53, 0.86) | 1.25  | (0.83, 1.88) |
| <b>Currently Using Drugs</b>            | 1.03                               | (0.86, 1.24) | 1.23  | (0.94, 1.62) |
| <b>Physical Health</b>                  |                                    |              |   |              |
| “Excellent/ Very Good”                  | 1.04                               | (0.87, 1.25) | 0.92  | (0.72, 1.17) |
| T-Cell>500                              | 1.07                               | (0.88, 1.29) | 1.15  | (0.89, 1.48) |
| <b>Mental Health</b>                    |                                    |              |   |              |
| Low Mental Functions                    | 0.64***                            | (0.54, 0.76) | 1.16  | (0.89, 1.51) |
| High Self-Efficacy                      | 1.03***                            | (1.02, 1.03) | 1.01*   | (1.00, 1.02) |
| <b>Time (interview rounds)</b>          | 0.99                               | (0.96, 1.03) | 0.99  | (0.90, 1.09) |
| <b>Diagnosed after 1995</b>             | 0.67**                             | (0.50, 0.91) | 0.88  | (0.62, 1.25) |
| <b>Residential Area (vs. Manhattan)</b> |                                    |              |   |              |
| Bronx                                   | 1.05                               | (0.82, 1.32) | 1.10  | (0.79, 1.53) |
| Brooklyn                                | 0.88                               | (0.68, 1.13) | 0.62*   | (0.42, 0.92) |
| Queens                                  | 1.42+                              | (0.99, 2.04) | 0.74  | (0.46, 1.21) |
| Staten Island                           | 1.49+                              | (0.97, 2.29) | 0.81  | (0.48, 1.37) |
| N of observations                       |                                    | 4,027        |   | 1,847        |
| N of respondents                        |                                    | 938          |   | 614          |
| Wald chi2                               |                                    | 170          |   | 52           |
| Probability > chi2                      |                                    | 0.000        |   | 0.000        |

+ p<0.1

\* p<0.05

\*\*p<0.01

\*\*\*p<0.001

<sup>1</sup> Cross-sectional time series logistic model using generalized estimation equation has been conducted because of the distribution of both dependent variables.

<sup>2</sup> Used questions were included since fifth round of interview. Any referral from social networks to find primary medical care provider, mental health professional and drug treatment services was considered as 1, and otherwise 0.

Because of contradictory results for heterosexual men and Hispanics, I checked the relationship between “perceived informational availability” for HIV services and “actually used informational sources” for HIV services. Interestingly, actual informational sources for HIV services were not impacted by the level of perceived availability for information of HIV services. For either people who answered having capability for searching or finding HIV services

or people who answered not having it, the distribution of informational resources for their service providers were very similar. Then, I ran couple of multivariate regression analyses to determine significant factors for finding service providers without using referral or informational sources from other people. Being MSM and interview time are two consistently significant predictors in the multivariate regression analyses. Being MSM was related to increased use of informational sources from others, while more people answered that they found their service providers on their own in more recent interviews. None of three perceived availability- having knowledge, having persons to ask, and having capability for finding HIV services- was related to the dependent variable which is finding service providers without any other informational source than respondents' own judgement (data not shown). Therefore, in sum, how people "feel" about getting information for demanded HIV services was not a good explanatory factor to explain how people found their service providers.

Multivariate regression analyses were conducted to investigate gender differences in informational sources used to find HIV services (Table 6). Among individual characteristics, homelessness, low mental health score, recently diagnosed, and low educational level are significant predictors of lower perceived knowledge for finding HIV services. Current drug use was a significant predictor of increased use of information from social networks, while being Black was associated with using fewer informational resources from social networks. Queens and Staten Island residents have more perceived knowledge for finding HIV services, while living in Brooklyn was associated with using less informational resources from social networks comparing to living in Manhattan.

MSM had significantly more knowledge in terms of finding HIV services than women and heterosexual men in Table 4, but the difference disappeared in multivariate regression, when individual characteristics were controlled, mainly due to the lower educational level of women and heterosexual men and high self efficacy for MSM. Being female is a significant predictor in regression of using informational resources from social networks to find services. Compared to women, heterosexual men used these resources 1.8 times more and MSM used them 1.7 times more. The difference decreased but remained significant, especially with MSM, when individual characteristics were controlled. Judging by these results, women were less likely to have or use informational resources from their social networks than their male counterparts, though gender differences were not statistically significant in perceived knowledge for finding HIV services.

## **2. Gender differences in using neighborhood service providers**

Gender differences in the awareness of and willingness to use neighborhood service providers were also explored (Table 7). During the fourth to sixth rounds of interviews (1997-1999), respondents were asked if their neighborhood/community contains medical providers, and if they do whether she/he uses them. When respondents answered that they were not aware of any HIV/AIDS service providers in their neighborhoods, they were also asked if they would prefer to receive services where they live.

Though the majority of respondents answered that they had neighborhood service providers, only one third used them. Surprisingly, more than half of respondents showed reluctance to use neighborhood medical care providers; 31% of respondents answered that they had neighborhood medical care providers but were not using them. Twenty-four percent said that they were not aware of neighborhood medical care providers and would not prefer to receive services from them even if these providers did in fact exist.

Gender differences existed both in the level of awareness of neighborhood service providers and the proportion of those using or willing to use them. Women were less likely to be aware of the existence of neighborhood service providers and less likely to use them than men. There are two possible reasons for women's lower awareness level; fewer services available in the neighborhoods in which women live, or women simply didn't acknowledge service providers in their neighborhoods as much as men did.

Gender differences in the level of use or willingness to use were profound. Sixty one percent of women did not get or did not prefer to get HIV/AIDS medical care from neighborhood providers, which is 16% more than heterosexual men and 9% more than MSM. Among men, heterosexual men were significantly more interested in using neighborhood service providers than MSM, in addition to their higher awareness level of neighborhood providers.

**Table 7. Neighborhood Service Use**

| Variables<br>(N=)                                 | All<br>(1,438) | Female<br>(610) | Heterosexual men<br>(415) | MSM<br>(413) | P-<br>value |
|---|----------------|-----------------|---------------------------|--------------|-------------|
| <b>Primary medical provider</b>                   |                |                 |                           |              |             |
| <b>Awareness of neighborhood service provider</b> |                |                 |                           |              |             |
| I know there are in my neighborhood               | 63%            | 58%             | 69%                       | 65%          | 0.000       |
| I am not aware of any in my neighborhood          | 37%            | 42%             | 31%                       | 35%          |             |
| <b>Use or Willingness to use</b>                  |                |                 |                           |              |             |
| There are and I use them                          | 32%            | 27%             | 39%                       | 33%          | 0.000       |
| I will or may use them if there are               | 13%            | 10%             | 13%                       | 15%          |             |
| There are, but I don't use them                   | 31%            | 30%             | 30%                       | 32%          |             |
| I will not use them even though there are         | 24%            | 32%             | 17%                       | 20%          |             |
| <b>Case management service provider</b>           |                |                 |                           |              |             |
| <b>Awareness of neighborhood service provider</b> |                |                 |                           |              |             |
| I know there are in my neighborhood               | 56%            | 53%             | 60%                       | 55%          | 0.099       |
| I am not aware of any in my neighborhood          | 44%            | 47%             | 40%                       | 45%          |             |
| <b>Use or Willingness to use</b>                  |                |                 |                           |              |             |
| There are and I use them.                         | 34%            | 28%             | 44%                       | 31%          | 0.000       |
| I will or may use them if there are               | 20%            | 15%             | 24%                       | 24%          |             |
| There are, but I don't use them                   | 22%            | 25%             | 16%                       | 24%          |             |
| I will not use them even though there are         | 24%            | 32%             | 16%                       | 21%          |             |

There are feasible explanations for women's unwillingness to use neighborhood service providers; women are more afraid of being identified as persons with HIV/AIDS than men, women are more satisfied with current providers even if those providers require them to travel long distances, women are more afraid to change primary medical care providers than men, etc. In fact, women's fear of being recognized as having HIV/AIDS was verified as one of the reasons for not using neighborhood service providers. Thirty-one percent of women, almost twice the number of heterosexual men, said that they would not prefer to use neighborhood services even if those services became available.

Ethnic and interview time differences were also investigated. There are no significant ethnic differences in the level of use or willingness to use neighborhood service providers among ethnic groups, but Hispanic people were significantly less aware of any service provider in their

neighborhoods than white or black. The level of awareness had been raised by interview time, either by increasing number of neighborhood service providers or by expanding their knowledge about service providers in neighborhoods. However, the level of use or willingness to use were not changed by time, which implicates that having service centers in neighborhood is not enough to reach to people with HIV/AIDS, even though they need services (data not shown.)

The mean distances to service providers were compared in the context of answers regarding use of neighborhood service providers (Table 8). The mean distance for persons using neighborhood service providers was obviously shorter than that of others. The mean distance to primary medical care providers for persons using neighborhood providers was 2.0 miles, 2.8 miles shorter than the remaining respondents.

The mean distance was longest for the group that knew of neighborhood services but didn't use them. These respondents on average traveled three more miles to meet their primary medical care providers than respondents who used neighborhood services. It is noteworthy that a substantial number of respondents (12%) wanted to use neighborhood service providers even though they were not currently doing so--either because their neighborhoods didn't have them or because they were unaware of them. These people traveled 2.6 miles further to meet their primary medical care providers and 1.3 miles further to get case management services than respondents who used neighborhood services.

**Table 8. Distance to Service Provider by Types of Neighborhood Service Utilization**

| Use of neighborhood service provider                 | All       | Heterosexual |           |           |
|--|-----------|--------------|-----------|-----------|
|  |           | Female       | men       | MSM       |
| <b>Primary medical provider</b> (N)                  | (1,438)   | (610)        | (415)     | (413)     |
| There are and I use them. mean ± sd (mile)           | 2.0 ± 2.5 | 2.0 ± 2.2    | 2.4 ± 2.9 | 1.7 ± 2.2 |
| There are, but I don't use them.                     | 5.0 ± 3.6 | 5.2 ± 3.6    | 5.2 ± 3.8 | 4.7 ± 3.3 |
| I prefer or doesn't matter to use them if there are. | 4.4 ± 3.4 | 4.0 ± 3.4    | 4.9 ± 3.3 | 4.3 ± 3.4 |
| I prefer not to use even though there are.           | 4.6 ± 3.2 | 4.2 ± 3.1    | 5.1 ± 3.2 | 5.3 ± 3.3 |
| <b>Case management service provider</b> (N)          | (875)     | (385)        | (267)     | (223)     |
| There are and I use them. mean ± sd (mile)           | 3.3 ± 3.6 | 3.2 ± 3.3    | 4.0 ± 4.0 | 2.3 ± 3.1 |
| There are, but I don't use them.                     | 4.7 ± 3.7 | 5.0 ± 3.8    | 4.4 ± 3.6 | 4.0 ± 3.3 |
| I prefer or doesn't matter to use them if there are. | 5.5 ± 3.9 | 5.7 ± 3.8    | 5.9 ± 4.2 | 4.8 ± 3.5 |
| I prefer not to use even though there are.           | 4.8 ± 3.6 | 4.9 ± 3.7    | 4.4 ± 3.1 | 5.1 ± 3.9 |

The variable for unwillingness to use neighborhood services was constructed with the values from Table 7. The persons who didn't use neighborhood service providers among those who had neighborhood service providers, and the persons who didn't want to use neighborhood providers among those who didn't have or didn't know neighborhoods service providers were considered as unwilling to use neighborhood services. In multivariate analyses of unwilling to use neighborhood services in Table 9, gender differences in unwillingness to use neighborhood services were quite notable. Being female was a strong predictor of an increase in unwillingness to use neighborhood services, compared to both heterosexual men and MSM. Women are 2 times less unwilling to use neighborhood services than men, after controlling individual characteristics and health status.

Interestingly, residential boroughs were significantly related to neighborhood service use. Persons living in Brooklyn, Bronx, and Queens were less likely and those in Staten Island more

likely than Manhattan residents to be willing to use neighborhood services. Less educated persons and recently diagnosed persons were more willing to use neighborhood services.

**Table 9. Multivariate Regression Analysis of Unwillingness of Neighborhood Service Use**<sup>1 2</sup>

| Factors                                 | OR      | 95% CI       |
|---|---------|--------------|
| <b>Gender</b>                           |         |              |
| Heterosexual male (vs. women)           | 0.48*** | (0.35, 0.65) |
| MSM (vs. women)                         | 0.56*** | (0.40, 0.80) |
| <b>Socioeconomic Characteristics</b>    |         |              |
| Age                                     | 1.00    | (0.98, 1.01) |
| Black (vs. White/other)                 | 1.00    | (0.66, 1.49) |
| Hispanic (vs. White/other)              | 1.53+   | (0.98, 2.40) |
| Did not graduate high school            | 0.63*** | (0.48, 0.84) |
| Household Income <\$7500 a year         | 0.81    | (0.64, 1.04) |
| Unstable Housing                        | 1.01    | (0.71, 1.44) |
| Homeless                                | 1.04    | (0.67, 1.60) |
| <b>Currently Using Drugs</b>            | 0.97    | (0.73, 1.29) |
| <b>Physical Health</b>                  |         |              |
| “Excellent/ Very Good”                  | 1.18    | (0.92, 1.52) |
| T-Cell>500                              | 1.03    | (0.79, 1.35) |
| <b>Mental Health</b>                    |         |              |
| Low Mental Functions                    | 0.98    | (0.75, 1.29) |
| High Self-Efficacy                      | 1.01    | (1.01, 1.02) |
| <b>Time (interview rounds )</b>         | 0.67*   | (0.96, 1.29) |
| <b>Diagnosed after 1995</b>             | 1.67**  | (0.47, 0.95) |
| <b>Residential Area (vs. Manhattan)</b> |         |              |
| Bronx                                   | 1.64**  | (1.17, 2.30) |
| Brooklyn                                | 2.07*** | (1.43, 3.01) |
| Queens                                  | 1.87*** | (1.18, 2.96) |
| Staten Island                           | 0.58*   | (0.35, 0.97) |
| N of observations                       |         | 1,408        |
| N of respondents                        |         | 662          |
| Wald chi2                               |         | 91           |
| Probability>chi2                        |         | 0.000        |

+ p<0.1

\* p<0.05

\*\*p<0.01

\*\*\*p<0.001

<sup>1</sup> Cross-sectional time series linear model using generalized estimation equation has been used. Log-linear regression for distance to primary medical care provider and logistic regression for unwillingness to use neighborhood service providers were conducted because of the distribution of dependent variables.(OR: Odd Ratio, CI: Confidence Interval).

<sup>2</sup> Data were collected during fourth, fifth, and sixth rounds of interviews.

### 3. Gender differences in Distance to Service Providers

The distance to service providers was measured in three groups; distance to primary medical provider, distance to case management service provider, and distance to all other service areas.

#### (1) Distance to primary medical provider

The distance between respondents' residences and the location of their primary medical providers was measured and is presented by gender in Table 10. The mean distance to primary medical providers from respondents' residential places was 3.7 miles. Half of respondents traveled less than three miles to their primary doctor, but the distance was more than five miles for 27% of respondents. The difference by gender was not significant in mean distance to one's

primary doctor, though gender difference was significant in categorized distances. More MSM traveled either very short or very long distances to see their primary doctors in comparison to heterosexual men or women.

**Table 10. Distance to Primary Medical Provider by Gender <sup>1</sup>**

| Distance<br>(N)               | All<br>(3,799) | Heterosexual      |                |                | P-value |
|-------------------------------|----------------|-------------------|----------------|----------------|---------|
|                               |                | Female<br>(1,588) | men<br>(1,055) | MSM<br>(1,156) |         |
| Mean distance $\pm$ SD (mile) | 3.8 $\pm$ 3.4  | 3.8 $\pm$ 3.4     | 3.7 $\pm$ 3.3  | 3.9 $\pm$ 3.5  | 0.502   |
| Categorized distance (%)      |                |                   |                |                |         |
| Less than 1 mile              | 21%            | 20%               | 21%            | 22%            | 0.029   |
| 1-3 miles                     | 31%            | 33%               | 30%            | 28%            |         |
| 3-5 miles                     | 21%            | 21%               | 22%            | 20%            |         |
| 5 miles or more               | 21%            | 26%               | 26%            | 30%            |         |

<sup>1</sup> 360 cases were excluded from this analysis for the following reasons: respondents had no primary medical provider for the last six months (200 cases), respondents were staying in a nursing home or drug treatment housing (105 cases), respondents were homeless (2 cases), primary medical providers' addresses were not able to be geocoded (53 cases).

Because the borough of Manhattan has more medical and social service organizations than other boroughs, the relationship between distance to primary medical care provider and residential borough was also investigated (Table 11).

**Table 11. Distance to Primary Medical Provider by Borough of Residence**

| Variable<br>(N)  | All<br>(3,799) | Manhattan<br>(1,099) | Bronx<br>(1,182) | Brooklyn<br>(877) | Queens<br>(382) | Staten<br>Island<br>(259) | P-<br>value |
|--|----------------|----------------------|------------------|-------------------|-----------------|---------------------------|-------------|
| <b>Distances to Primary Medical Care Provider</b>        |                |                      |                  |                   |                 |                           |             |
| Mean $\pm$ SD (mile)                                     | 3.8 $\pm$ 3.4  | 2.4 $\pm$ 2.3        | 4.0 $\pm$ 3.3    | 4.2 $\pm$ 3.3     | 5.4 $\pm$ 3.7   | 5.1 $\pm$ 4.9             | 0.000       |
| <b>Residential Borough</b>                               |                |                      |                  |                   |                 |                           |             |
| Women  | (1,588)        | 20%                  | 36%              | 27%               | 9%              | 7%                        | 0.000       |
| Heterosexual men   | (1,055)        | 22%                  | 37%              | 23%               | 9%              | 9%                        |             |
| MSM  | (1,156)        | 48%                  | 18%              | 17%               | 12%             | 5%                        |             |
| <b>Having Primary Medical Care Provider in Manhattan</b> |                |                      |                  |                   |                 |                           |             |
| Women  | (1,588)        | 93%                  | 40%              | 28%               | 33%             | 15%                       | 0.000       |
| Heterosexual men   | (1,055)        | 96%                  | 45%              | 27%               | 19%             | 19%                       |             |
| MSM  | (1,156)        | 97%                  | 57%              | 57%               | 55%             | 32%                       |             |

As expected, residential borough was significantly related to the distance to primary doctors. Residents in the other four boroughs went 1.6 to 3.0 miles further to get their primary health care than Manhattan residents. More MSM lived in Manhattan, and more MSM who lived in other boroughs came to Manhattan to see their primary medical care providers than women or heterosexual men. Forty-eight percent of MSM lived in Manhattan, but only 20% of women and 22% of heterosexual men lived in Manhattan, where most residents had their primary care provider in the same borough. More than two thirds of women and heterosexual men who lived in the other boroughs had their primary care providers in that same borough, while the majority of MSM who lived in the other boroughs came to Manhattan to receive primary medical care

services. More tables about distances to providers by residential boroughs were presented in the end of this study (Appendix 1-4).

The relationship between distance and organizational type of primary medical care providers was explored (Table 12). The distance significantly differed by organizational type of primary medical provider. The average distance to voluntary hospitals (4.3 miles) and private medical doctors (3.8 miles) was farther than to other types of medical providers. MSM went more frequently to private doctors than heterosexual men and women, though the majority of all three groups had voluntary hospitals as their primary medical care providers. Therefore, use of a voluntary hospital was an important factor to increase the mean distance for heterosexual men, while having a private doctor was also significant for MSM.

**Table 12. Distance to Primary Medical Provider by Organizational Type**

| (N)                  | All<br>(3,799) | NYC<br>HHC <sup>1</sup><br>(676) | Voluntary<br>Hospital<br>(1,984) | Community<br>health clinic<br>(550) | Private<br>MD<br>(386) | Other <sup>2</sup><br>(203) | P-value |
|----------------------|----------------|----------------------------------|----------------------------------|-------------------------------------|------------------------|-----------------------------|---------|
| Mean $\pm$ SD (mile) | 3.8 $\pm$ 3.4  | 3.1 $\pm$ 2.9                    | 4.3 $\pm$ 3.6                    | 3.3 $\pm$ 3.2                       | 3.8 $\pm$ 3.2          | 2.8 $\pm$ 2.5               | 0.000   |
| Gender (%)           |                |                                  |                                  |                                     |                        |                             |         |
| Women                | (1,588)        | 21%                              | 52%                              | 15%                                 | 6%                     | 6%                          | 0.000   |
| Heterosexual men     | (1,055)        | 24%                              | 53%                              | 12%                                 | 3%                     | 8%                          |         |
| MSM                  | (1,156)        | 7%                               | 52%                              | 16%                                 | 22%                    | 3%                          |         |

<sup>1</sup> HHC: NYC Health & Hospital Corp.

<sup>2</sup> Other includes drug treatment, social service, and uncategorized organizations.

I also investigated if any change occurred in the distance to primary medical care providers by gender during the study period (Table 13). In general, people went further to get primary medical services by time. The distances increased from 3.7 miles for first round of interview to 4.0 miles for the last round of interviews, and this increase was made by both male groups. The distances had been gradually increased by more than a half mile for both heterosexual men and MSM, while no significant change had occurred for women.

**Table 13. Distances of Primary Medical Provider by Time and Gender**

| Mean distance $\pm$ SD (mile)<br>(Total N=3,799) | 1995-6<br>(Round 1,2)<br>(1112) | 1996-97<br>(Round 3,4)<br>(853) | 1997-99<br>(Round 5,6)<br>(1049) | 2000-02<br>(Round 7,8)<br>(785) |
|--|---------------------------------|---------------------------------|----------------------------------|---------------------------------|
| All  | 3.7 $\pm$ 3.4                   | 3.8 $\pm$ 3.4                   | 3.9 $\pm$ 3.3                    | 4.0 $\pm$ 3.4                   |
| Women  | 3.7 $\pm$ 3.5                   | 3.8 $\pm$ 3.4                   | 3.8 $\pm$ 3.2                    | 3.8 $\pm$ 3.3                   |
| Heterosexual men                                 | 3.4 $\pm$ 3.2                   | 3.7 $\pm$ 3.5                   | 4.0 $\pm$ 3.6                    | 4.0 $\pm$ 3.1                   |
| MSM  | 3.8 $\pm$ 3.4                   | 3.9 $\pm$ 3.7                   | 3.9 $\pm$ 3.4                    | 4.3 $\pm$ 3.9                   |

To learn the reason for increasing mean distances to primary medical providers, I investigated those who changed their primary medical provider during the study period by comparing organizational types before and after the change. Among respondents with at least two rounds of interviews, 24% of respondents had changed their primary medical providers since previous interviews. In fact, a little bit more women (26%) than heterosexual men (22%) or MSM (23%) had changed their medical providers between interviews. The majority changed their primary medical providers to voluntary hospitals or private doctors from NYC HHC or community health clinic users. The proportion of voluntary hospitals was increased by about 5% for women and heterosexual men among those who changed their primary medical providers,

while MSM increased the proportion of private doctors by 9%. In cases with a measured distance, the mean distance with a changed primary medical provider was 4.12 miles, while the mean distance with the same provider was 3.84 miles, a statistically significant difference.

**Table 14. Multivariate Regression Analysis of The Distance to Primary Medical Care Provider<sup>1</sup>**

| Factors                                 | IRR      | 95% CI         |
|---|----------|----------------|
| <b>Gender</b>                           |          |                |
| Heterosexual male (vs. women)           | 0.99     | (0.92, 1.07)   |
| MSM (vs. women)                         | 1.18***  | (1.09, 1.28)   |
| <b>Socioeconomic Characteristics</b>    |          |                |
| Age                                     | 1.00     | (0.996, 1.003) |
| Black (vs. White/other)                 | 1.11*    | (1.01, 1.22)   |
| Hispanic (vs. White/other)              | 1.15**   | (1.04, 1.27)   |
| Did not graduate high school            | 0.87***  | (0.82, 0.93)   |
| Household Income <\$7500 a year         | 0.94***  | (0.92, 0.97)   |
| Unstable Housing (vs. Stable)           | 1.13***  | (1.09, 1.17)   |
| Homeless (vs. Stable)                   | 1.14***  | (1.09, 1.19)   |
| <b>Currently Using Drugs</b>            | 0.94**   | (0.91, 0.98)   |
| <b>Physical Health</b>                  |          |                |
| “Excellent/ Very Good”                  | 0.99     | (0.96, 1.02)   |
| T-Cell>500                              | 1.02     | (0.99, 1.06)   |
| <b>Mental Health</b>                    |          |                |
| Low Mental Functions (MCS<37)           | 1.00     | (0.97, 1.03)   |
| High Self-Efficacy                      | 1.00     | (0.999, 1.001) |
| <b>Time (interview rounds )</b>         | 1.016*** | (1.010, 1.022) |
| <b>Diagnosed after 1995</b>             | 0.89*    | (0.81, 0.98)   |
| <b>Residential Area (vs. Manhattan)</b> |          |                |
| Bronx                                   | 1.90***  | (1.79, 2.02)   |
| Brooklyn                                | 1.99***  | (1.85, 2.13)   |
| Queens                                  | 2.32***  | (2.14, 2.51)   |
| Staten Island                           | 2.19***  | (1.99, 2.41)   |
| N of observations                       | 3,777    |                |
| N of respondents                        | 891      |                |
| Wald chi2                               | 757      |                |
| Probability>chi2                        | 0.000    |                |

\* p&lt;0.05

\*\*p&lt;0.01

\*\*\*p&lt;0.001

<sup>1</sup> Cross-sectional time series log-linear model using generalized estimation equation has been used for analysis on distance to primary medical provider since the dependent variable has a Poisson distribution. All results are displayed as the exponential coefficients and corresponding confidence intervals (IRR: Incident Rate Ratio, CI: Confidence Interval).

Multivariate regression analyses were conducted to investigate gender difference in terms of the distance to primary medical providers, after controlling individual characteristics (Table 14). The results of multivariate log-linear regression analyses are presented in Table 8. Borough of residence were included in the regression, since they were found to make a difference in terms of distance to one’s primary medical provider.

After controlling for residential borough and organizational types, gender became a statistically significant predictor of distance to a primary medical provider. Being MSM became a significant predictor to increase the distance to one’s primary medical provider, compared to

women or heterosexual men. The difference between heterosexual men and women was not significant in terms of distance to one's primary medical care provider.

Ethnicity and socioeconomic characteristics were significantly related to distance, while physical and mental health status was not. The poor and those who did not graduate from high school, which women were more likely to be than men, were associated with closer primary medical providers, while Blacks, Hispanics, and the homeless or unstably housed were more likely to travel longer distances to primary medical providers. Being Black and Hispanic became less significant after controlling for residential borough, since fewer Blacks and Hispanics lived in Manhattan than Whites.

## (2) Distance to case management service providers

Distances to case management service providers were measured. Case management service providers include case managers, social workers, or any other paid employee of a social or medical service agency that helps arrange for services. Fifty-five percent of respondents had at least one case management service provider, and 30% of those had more than one provider. The average number of case management providers among persons with at least one provider was 1.4. Since some respondents had multiple providers, the main provider was assigned on the basis of frequency of visits during the six months prior to interview and the length of the most recent visit. Providers with more frequent and recent visits were assumed to be the main case management service providers.

**Table 15. Distance to Case Management Service Provider by Gender <sup>1</sup>**

| Distance<br>(N)           | All<br>(2,362) | Female<br>(1,038) | Heterosexual men |              | P-value |
|---------------------------|----------------|-------------------|------------------|--------------|---------|
|                           |                |                   | MSM<br>(678)     | MSM<br>(646) |         |
| Mean distance ± SD (mile) | 4.7 ± 3.8      | 4.9 ± 3.8         | 4.9 ± 3.9        | 4.4 ± 3.7    | 0.010   |
| Categorized distance (%)  |                |                   |                  |              |         |
| Less than 1 mile          | 18%            | 16%               | 19%              | 19%          | 0.055   |
| 1-3 miles                 | 25%            | 26%               | 22%              | 26%          |         |
| 3-5 miles                 | 17%            | 17%               | 15%              | 17%          |         |
| 5 miles or more           | 41%            | 41%               | 34%              | 37%          |         |

\* p<0.05

\*\*p<0.01

\*\*\*p<0.001

<sup>1</sup> Among 2,446 interviews with respondents with at least one case manager, the distance could not be measured for 84 cases. Fifty-seven case managers had addresses which were not able to be geocoded, 21 cases had a general code, and 5 cases had addresses outside of NYC. One case with a homeless person was also dropped.

The distances to main case management service providers are listed in Table 15. The mean distance to providers was 4.7 miles, one mile farther than the mean distance to primary medical providers. Forty percent of respondents went more than five miles to receive their main case management services. In comparison by gender, in opposition to the findings on primary medical providers, MSM on average traveled 0.5 miles less to case management service providers than women and heterosexual men.

The differences in distance by organizational type are presented in Table 16. The table shows that long distances to case management service providers were often due to the distance to the New York City Human Resource Administration (NYCHRA), including the Division of AIDS Services (DAS) and the HIV/AIDS Services Administration (HASA). The mean distance to NYCHRA was 8.0 miles, more than twice as far as the distance to other organizational types.

Significantly more heterosexual men (26%) used NYCHRA as their main providers for case management services than women (21%) and MSM (18%), while MSM were more likely to use social service agencies than others.

**Table 16. Distance to Case Management Service Provider by Organizational Type**

|                           | All<br>(Total N=2,362) | Medical<br>service<br>(799) | Drug<br>treatment<br>(200) | Social<br>service<br>(896) | NYC<br>HRA <sup>1</sup><br>(514) | P-value |
|---------------------------|------------------------|-----------------------------|----------------------------|----------------------------|----------------------------------|---------|
| Mean distance ± SD (mile) | 4.7 ± 3.8              | 3.7 ± 3.3                   | 3.1 ± 2.8                  | 4.0 ± 3.7                  | 8.0 ± 3.3                        | 0.000   |
| All                       | (2,362)                | 33%                         | 8%                         | 36%                        | 22%                              | 0.000   |
| Women                     | (1,588)                | 35%                         | 9%                         | 35%                        | 21%                              |         |
| Heterosexual men          | (1,055)                | 34%                         | 12%                        | 29%                        | 26%                              |         |
| MSM                       | (1,156)                | 30%                         | 4%                         | 47%                        | 18%                              |         |

<sup>1</sup> New York City Human Resource Administration for Public Assistance or DAS (Division of AIDS Services) / HASA (HIV/AIDS Services Administration)

The trend of distances to case management service providers was also investigated (Table 17). The mean distance decreased for all three groups in relation to the year of the interview. During the study period, the distance for heterosexual men decreased by 1.4 miles, twice as much as the decrease for women and MSM.

**Table 17. Distance to and Type of Case Management Service Provider by Time**

| Mean distance ± SD (mile)<br>(Total N=2,362)                    | 1995-6<br>(Round 1,2)<br>(715) | 1996-97<br>(Round 3,4)<br>(515) | 1997-9<br>(Round 5,6)<br>(729) | 2000-02<br>(Round 7,8)<br>(450) |
|---|--------------------------------|---------------------------------|--------------------------------|---------------------------------|
| <b>Distance to Case Management Service Providers</b>            |                                |                                 |                                |                                 |
| All   | 5.1 ± 3.9                      | 4.9 ± 3.8                       | 4.3 ± 3.8                      | 4.3 ± 3.7                       |
| Women   | 5.2 ± 4.0                      | 5.1 ± 3.8                       | 4.7 ± 3.7                      | 4.5 ± 3.6                       |
| Heterosexual men  | 5.4 ± 3.9                      | 5.3 ± 4.0                       | 4.6 ± 3.9                      | 4.0 ± 3.4                       |
| MSM   | 5.0 ± 3.7                      | 4.2 ± 3.4                       | 3.7 ± 3.5                      | 4.4 ± 4.0                       |
| <b>Organizational Type of Case Management Service Providers</b> |                                |                                 |                                |                                 |
| Medical service facility  | 36%                            | 34%                             | 33%                            | 28%                             |
| Drug treatment facility   | 7%                             | 9%                              | 8%                             | 9%                              |
| Social service facility   | 29%                            | 34%                             | 42%                            | 47%                             |
| NYC HRA (DAS/HASA)  | 28%                            | 23%                             | 17%                            | 15%                             |

To ascertain the reason for decreased distances, I compared the distribution of organizational types by interview rounds, since the mean distance to NYCHRA was substantially longer than to other types. The results explain the decrease; organizational types changed significantly by interview rounds. More respondents began receiving their case management services from social service providers, while the number of those receiving similar services in medical facilities and NYCHRA decreased. Since more heterosexual men who previously used medical facilities and NYCHRA changed to social services, the mean distance for heterosexual men decreased more than for the other two groups. Therefore, even though women and heterosexual men traveled longer distances than MSM on average, heterosexual men more frequently changed their case management provider to one at a closer distance. As a result the distances traveled in more recent interviews of heterosexual men were significantly less than those of women.

**Table 18. Multivariate Regression Analysis of The Distance to Case Management Service Provider<sup>1</sup>**

| Factors                                       | IRR     | 95% CI         |
|---|---------|----------------|
| <b>Demographic Characteristics</b>            |         |                |
| Heterosexual male (vs. women)                 | 0.98    | (0.92, 1.03)   |
| MSM (vs. women)                               | 1.01    | (0.94, 1.08)   |
| <b>Socioeconomic Characteristics</b>          |         |                |
| Age   | 1.00    | (0.994, 1.000) |
| Black (vs. White/other)                       | 1.15**  | (1.06, 1.25)   |
| Hispanic (vs. White/other)                    | 1.11*   | (1.02, 1.22)   |
| Less than High School Education               | 0.92**  | (0.88, 0.97)   |
| Household Income<\$7500 a year                | 0.96*   | (0.92, 0.998)  |
| Unstable Housing (vs. Stable)                 | 1.07    | (1.02, 1.13)   |
| Homeless (vs. Stable)                         | 1.05    | (0.99, 1.11)   |
| <b>Current Drug Use</b>                       | 0.97    | (0.92, 1.01)   |
| <b>Physical Health Status</b>                 |         |                |
| Health "Excellent/ Very Good"                 | 1.02    | (0.98, 1.06)   |
| T-Cell>500                                    | 1.04    | (0.995, 1.09)  |
| <b>Mental Health</b>                          |         |                |
| Low Mental Health Functioning (MCS<37)        | 1.05*   | (1.01, 1.09)   |
| Self-Efficacy                                 | 1.001   | (0.999, 1.002) |
| <b>Time</b> (interview round)                 | 0.995   | (0.99, 1.01)   |
| <b>Diagnosed after 1995</b> (vs. before 1995) | 0.86*** | (0.79, 0.93)   |
| <b>Residential area</b> (vs. Manhattan)       |         |                |
| Bronx   | 2.05*** | (1.91, 2.19)   |
| Brooklyn                                      | 1.51*** | (1.40, 1.63)   |
| Queens  | 2.36*** | (2.16, 2.58)   |
| Staten Island                                 | 1.92*** | (1.73, 2.12)   |
| <b>NYC HRA client<sup>2</sup></b>             | 1.93*** | (1.86, 2.01)   |
| N of observations                             |         | 2,300          |
| N of respondents                              |         | 777            |
| Wald chi2                                     |         | 1,909          |
| Probability>chi2                              |         | 0.000          |

+ p<0.1      \* p<0.05      \*\*p<0.01      \*\*\*p<0.001

<sup>1</sup> Cross-sectional time series log-linear model using generalized estimation equation has been used for analysis on distance to case management organizations since the dependent variable has a Poisson distribution. All results are displayed as the exponential coefficients and corresponding confidence intervals (IRR: Incident Rate Ratio, CI: Confidence Interval).

<sup>2</sup> New York City Human Resource Administration for Public Assistance or DAS (Division of AIDS Services) / HASA (HIV/AIDS Services Administration)

Finally, multivariate regression analysis was conducted to determine which variables were independently related to the distance to case management service providers. The results of multivariate log-linear regression analysis are presented in Table 18. Two more variables, borough of residence and whether NYCHRA was the respondents' main case management provider, were included, since these variables were found to make the difference in the distance to case managers.

Unlike the results on primary medical providers, which became significant when residential boroughs were controlled, gender difference on distance to case management service providers disappeared after residential borough and organizational types were controlled. All three gender groups had a similar effect on the distance to case managers. Being Black and Hispanic were still significant factors in increasing the distance, even though ethnic differences

became less significant after controlling residential boroughs and organizational types. Blacks, Hispanics, and those with low mental health functioning were related to an increase in distance, while low educational level, being poor and recently diagnosed were significantly related to a decrease in distance. Therefore, the significant difference in mean distance to case management service providers between MSM and the other two groups was mainly due to the fact that both heterosexual men and women often lived in boroughs other than Manhattan.

### (3) Distance to Other Service Providers

Table 19 displays the mean distances to service providers, excluding primary medical providers and case management service providers, in each service area by gender. Gender differences were statistically significant in distance to social services, while no gender difference in the distance to service providers was found among health service areas, except special medical treatment. Women, in general, traveled farther to get services than men. Women had a longer mean distance than heterosexual men and MSM in receiving special medical treatment, housing, and financial services. MSM had the shortest distance to travel for food/meals, while heterosexual men had the shortest mean distance for support group services.

**Table 19. Distance to Service Providers of Selected Service Areas(miles)**

| Areas            | Inpatient                 |           | ER                          |           | Outpatient                 |           | Dental         |           |
|------------------|---------------------------|-----------|-----------------------------|-----------|----------------------------|-----------|----------------|-----------|
|                  | (n)                       | Mean ± SD | (n)                         | Mean ± SD | (n)                        | Mean ± SD | (n)            | Mean ± SD |
| All users        | 1045                      | 3.5 ± 3.4 | 1500                        | 3.3 ± 3.5 | 4552                       | 3.8 ± 3.4 | 1445           | 3.4 ± 3.3 |
| <b>Gender</b>    |                           |           |                             |           |                            |           |                |           |
| Female           | 479                       | 3.2 ± 3.2 | 707                         | 3.3 ± 3.4 | 1869                       | 3.8 ± 3.4 | 559            | 3.3 ± 3.3 |
| Heterosexual men | 318                       | 3.6 ± 3.8 | 415                         | 3.4 ± 3.6 | 1190                       | 3.9 ± 3.5 | 351            | 3.3 ± 3.4 |
| MSM              | 248                       | 3.8 ± 3.3 | 378                         | 3.4 ± 3.3 | 1493                       | 3.8 ± 3.4 | 535            | 3.5 ± 3.3 |
| Areas            | Special Medical Treatment |           | Drug Treatment <sup>1</sup> |           | Mental Health              |           | Support Group  |           |
|                  | (n)                       | Mean ± SD | (n)                         | Mean ± SD | (n)                        | Mean ± SD | (n)            | Mean ± SD |
| All users        | 1829                      | 3.9 ± 3.5 | 843                         | 3.5 ± 3.8 | 1143                       | 3.9 ± 3.7 | 1318           | 3.8 ± 3.4 |
| <b>Gender</b>    |                           | *         |                             |           |                            |           |                | ***       |
| Female           | 653                       | 4.2 ± 3.5 | 334                         | 3.4 ± 3.6 | 408                        | 3.9 ± 3.5 | 608            | 4.0 ± 3.5 |
| Heterosexual men | 427                       | 3.9 ± 3.6 | 390                         | 3.5 ± 3.9 | 233                        | 3.8 ± 4.3 | 317            | 2.9 ± 3.4 |
| MSM              | 749                       | 3.7 ± 3.4 | 119                         | 4.1 ± 3.6 | 502                        | 4.0 ± 3.6 | 393            | 4.2 ± 3.2 |
| Areas            | Housing Services          |           | Financial Matters           |           | Psychological Difficulties |           | Food and Meals |           |
|                  | (n)                       | Mean ± SD | (n)                         | Mean ± SD | (n)                        | Mean ± SD | (n)            | Mean ± SD |
| All users        | 1150                      | 5.3 ± 3.8 | 774                         | 5.7 ± 4.1 | 570                        | 3.6 ± 3.3 | 470            | 5.3 ± 3.8 |
| <b>Gender</b>    |                           | **        |                             | ***       |                            |           |                | ***       |
| Female           | 493                       | 5.7 ± 3.8 | 317                         | 6.3 ± 4.1 | 144                        | 3.7 ± 3.0 | 175            | 6.0 ± 3.7 |
| Heterosexual men | 332                       | 5.2 ± 3.7 | 207                         | 6.0 ± 4.1 | 101                        | 4.0 ± 4.1 | 107            | 6.1 ± 4.0 |
| MSM              | 325                       | 4.8 ± 3.9 | 250                         | 4.7 ± 3.7 | 325                        | 3.4 ± 3.1 | 188            | 4.2 ± 3.6 |

\* p<0.05      \*\*p<0.01      \*\*\*p<0.001

<sup>1</sup> In-patient or residential alcohol and drug treatment and halfway house were not included to measure the distance to drug treatment organizations

In general, people went further to get social services than health services. The mean distance traveled for health services was shorter than for social services by one or two miles, which is similar to previous findings that the mean distance to primary medical providers was

one mile shorter than the mean distance to case managers (3.7 miles and 4.7 miles respectively). Among twelve service areas, ER services had the shortest mean distance, 3.3 miles, while the distance to financial services was the longest, 5.7 miles. Providers of professional mental health services were located farther than others among health services.

In sum, even though the distances to service providers among three groups were not significantly different, women were less knowledgeable and fewer informational resources of HIV services than both heterosexual men and MSM and women had significantly lower willingness to use neighborhood service use.

## CONCLUSION

Enormous innovation continues to improve outcomes for persons living with HIV/AIDS, resulting in increased longevity and improved quality of life. HIV/AIDS is now viewed more as a chronic condition than a life threatening or fatal disease. Nonetheless, the incidence of HIV/AIDS continues to increase, especially among people with multiple needs. Therefore, how to inform people of existing services and deliver services to those in need is the core policy question regarding HIV/AIDS.

This study demonstrated that individual characteristics, most importantly gender, are associated with different patterns of service utilization. That women were found to be less likely to be aware of neighborhood medical care providers than men, and women were also less likely to use or be willing to use neighborhood services than men. In analysis of distance to one's primary medical provider, gender became a strong predictor after controlling other factors. Being MSM was related to an increase in distance, even though a higher proportion of MSM lived in Manhattan, where the majority of respondents' medical care providers exist. Being heterosexual man or woman was related to a decrease in distance due to being less educated and poor--more likely characteristics of women with HIV.

Creation of a comprehensive HIV care system is the most important issue for people with HIV/AIDS, not only for the prevention of HIV transmission, but also for the quality of life for those living with HIV/AIDS. However, as shown in this study, different people have different needs and use different services. There is no single, most desirable model that fits everyone. This study suggests that classifying the HIV population by need and patterns of service use, and developing diverse models for target groups are the methods policy makers should employ to build a comprehensive care system for the HIV population. According to the results of this study, persons who were less educated had more service needs but less knowledge on how to find HIV services, resulting in fewer service uses compared to others. These people also had significantly less neighborhood based social capital, and, probably as a result, didn't mind using neighborhood services. This group would benefit from easily accessed local service centers and case managers who could work as informational sources regarding existing services. On the other hand, women showed reluctance to use local or neighborhood services, but also didn't go far to receive services. Voluntary or community hospitals with on-site integrated service systems and easily accessed transportation would be a comprehensive model for them. Therefore, typology with regard to patterns of service use and service need must be considered in constructing comprehensive care models for people living with HIV. This study also emphasized the need for a social- ecological perspective in analyzing service utilization. This study shows

that women were less aware of available social and health services and more reluctant to use local services, in addition to the fact that they lived in neighborhoods with fewer government funded HIV service providers.

This study also uncovered the fact that neighborhoods and residential boroughs are significantly related to service utilization. Women were more likely to show unwillingness to use local community service providers and thus traveled further to receive services than men. Residential borough was consistently found to be a significant factor, and the differences between the five boroughs varying in each question and each service area. Queens residents are less willing to use neighborhood services, even though they have relatively higher level of knowledge about HIV services. Brooklyn residents have the least informational resources from their social networks. These findings suggest that a geographical approach in analysis of neighborhood service utilization is required to find a more appropriate model for a comprehensive service delivery system.

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**Appendix 1. Primary Medical Providers by Borough of Residence**

|  | Manhattan | Bronx     | Brooklyn  | Queens    | Staten Island | P-value |
|--|-----------|-----------|-----------|-----------|---------------|---------|
| (Total N=3,875)                              | (1,099)   | (1,182)   | (877)     | (382)     | (259)         |         |
| <b>Distances to Primary Medical Provider</b> |           |           |           |           |               |         |
| Mean distance ± SD (miles)                   | 2.39±2.26 | 4.04±3.32 | 4.22±3.32 | 5.38±3.74 | 5.06±4.94     | 0.000   |
| Categorized distance (%)                     |           |           |           |           |               |         |
| Less than 1 mile                             | 35%       | 16%       | 15%       | 11%       | 19%           | 0.000   |
| 1-3 mile                                     | 35%       | 33%       | 30%       | 19%       | 24%           |         |
| 3-5 mile                                     | 19%       | 21%       | 21%       | 22%       | 30%           |         |
| 5-10 mile                                    | 10%       | 24%       | 28%       | 36%       | 10%           |         |
| 10 mile or more                              | 1%        | 6%        | 7%        | 12%       | 18%           |         |
| <b>Borough of Primary Medical Provider</b>   |           |           |           |           |               |         |
| Manhattan                                    | 95%       | 44%       | 34%       | 37%       | 20%           | 0.000   |
| Bronx  | 3%        | 54%       | 3%        | 3%        | 1%            |         |
| Brooklyn                                     | 1%        | <1%       | 60%       | 9%        | 3%            |         |
| Queens                                       | <1%       | <1%       | 2%        | 49%       | 0%            |         |
| Staten Island                                | 0%        | <1%       | 1%        | 1%        | 76%           |         |

**Appendix 2. Distances to Service Providers by Residential Borough(miles)**

|                            | <b>Inpatient</b>       |               | <b>ER</b>                |               | <b>Outpatient</b>                 |               | <b>Dental</b>                    |               |
|----------------------------|------------------------|---------------|--------------------------|---------------|-----------------------------------|---------------|----------------------------------|---------------|
| <b>Characteristics</b>     | (n)                    | Mean $\pm$ SD | (n)                      | Mean $\pm$ SD | (n)                               | Mean $\pm$ SD | (n)                              | Mean $\pm$ SD |
| All users                  | 1045                   | 3.5 $\pm$ 3.4 | 1500                     | 3.3 $\pm$ 3.5 | 4552                              | 3.8 $\pm$ 3.4 | 1445                             | 3.4 $\pm$ 3.3 |
| <b>Residential Borough</b> |                        | ***           |                          | ***           |                                   | ***           |                                  | ***           |
| Manhattan                  | 278                    | 2.6 $\pm$ 2.6 | 418                      | 2.4 $\pm$ 2.6 | 1374                              | 2.4 $\pm$ 2.3 | 494                              | 2.6 $\pm$ 2.6 |
| Bronx                      | 366                    | 3.4 $\pm$ 3.3 | 554                      | 3.1 $\pm$ 3.3 | 1339                              | 4.1 $\pm$ 3.4 | 408                              | 3.2 $\pm$ 3.4 |
| Brooklyn                   | 234                    | 3.8 $\pm$ 3.5 | 307                      | 3.8 $\pm$ 3.4 | 1070                              | 4.2 $\pm$ 3.3 | 304                              | 4.2 $\pm$ 3.6 |
| Queens                     | 79                     | 4.7 $\pm$ 3.4 | 98                       | 4.5 $\pm$ 3.7 | 464                               | 5.4 $\pm$ 3.7 | 111                              | 5.2 $\pm$ 3.4 |
| Staten Island              | 88                     | 5.0 $\pm$ 5.0 | 123                      | 5.3 $\pm$ 5.1 | 305                               | 5.5 $\pm$ 5.1 | 128                              | 3.4 $\pm$ 3.8 |
|                            | <b>Drug Treatment</b>  |               | <b>Mental Health</b>     |               | <b>Support Group</b>              |               | <b>Special Medical Treatment</b> |               |
| <b>Characteristics</b>     | (n)                    | Mean $\pm$ SD | (n)                      | Mean $\pm$ SD | (n)                               | Mean $\pm$ SD | (n)                              | Mean $\pm$ SD |
| All users                  | 843                    | 3.5 $\pm$ 3.8 | 1143                     | 3.9 $\pm$ 3.7 | 1318                              | 3.8 $\pm$ 3.4 | 1829                             | 3.9 $\pm$ 3.5 |
| <b>Residential Borough</b> |                        | ***           |                          | ***           |                                   | ***           |                                  | ***           |
| Manhattan                  | 196                    | 2.7 $\pm$ 4.1 | 397                      | 2.6 $\pm$ 2.3 | 431                               | 2.5 $\pm$ 2.4 | 683                              | 2.4 $\pm$ 2.4 |
| Bronx                      | 333                    | 3.0 $\pm$ 3.4 | 320                      | 3.8 $\pm$ 3.8 | 439                               | 4.0 $\pm$ 3.5 | 446                              | 4.4 $\pm$ 3.8 |
| Brooklyn                   | 173                    | 4.2 $\pm$ 2.8 | 241                      | 4.6 $\pm$ 3.0 | 237                               | 5.0 $\pm$ 3.6 | 457                              | 5.0 $\pm$ 3.3 |
| Queens                     | 54                     | 6.1 $\pm$ 4.0 | 85                       | 5.5 $\pm$ 4.2 | 62                                | 5.9 $\pm$ 2.9 | 111                              | 5.6 $\pm$ 3.8 |
| Staten Island              | 88                     | 4.5 $\pm$ 4.5 | 100                      | 6.5 $\pm$ 6.0 | 149                               | 4.0 $\pm$ 4.0 | 132                              | 4.9 $\pm$ 4.9 |
|                            | <b>Housing Service</b> |               | <b>Financial Matters</b> |               | <b>Psychological Difficulties</b> |               | <b>Food and Meals</b>            |               |
| <b>Characteristics</b>     | (n)                    | Mean $\pm$ SD | (n)                      | Mean $\pm$ SD | (n)                               | Mean $\pm$ SD | (n)                              | Mean $\pm$ SD |
| All users                  | 1150                   | 5.3 $\pm$ 3.8 | 774                      | 5.7 $\pm$ 4.1 | 570                               | 3.6 $\pm$ 3.3 | 470                              | 5.3 $\pm$ 3.8 |
| <b>Residential Borough</b> |                        | ***           |                          | ***           |                                   | ***           |                                  | ***           |
| Manhattan                  | 359                    | 3.7 $\pm$ 3.0 | 238                      | 3.0 $\pm$ 2.6 | 284                               | 2.3 $\pm$ 1.9 | 198                              | 3.1 $\pm$ 2.6 |
| Bronx                      | 407                    | 6.7 $\pm$ 4.3 | 238                      | 7.6 $\pm$ 4.4 | 105                               | 4.5 $\pm$ 3.7 | 122                              | 7.8 $\pm$ 4.0 |
| Brooklyn                   | 248                    | 4.8 $\pm$ 3.1 | 190                      | 5.7 $\pm$ 3.1 | 103                               | 4.8 $\pm$ 3.0 | 76                               | 6.0 $\pm$ 2.6 |
| Queens                     | 54                     | 7.4 $\pm$ 3.1 | 50                       | 6.8 $\pm$ 3.2 | 38                                | 4.8 $\pm$ 3.1 | 20                               | 7.2 $\pm$ 3.2 |
| Staten Island              | 82                     | 6.1 $\pm$ 4.3 | 58                       | 8.3 $\pm$ 4.3 | 40                                | 5.8 $\pm$ 6.2 | 54                               | 5.9 $\pm$ 4.4 |

**Appendix 3. Borough of Health Service Providers by Borough of Residence**

| Provider ( Recipients                     | All | Manhattan | Bronx | Brooklyn | Queens | Staten Island | p-value |
|---|-----|-----------|-------|----------|--------|---------------|---------|
| <b>Inpatient (N=1,045)</b>                |     |           |       |          |        |               |         |
| Manhattan                                 | 44% | 92%       | 34%   | 18%      | 28%    | 14%           | 0.000   |
| Bronx                                     | 24% | 4%        | 64%   | 3%       | 3%     | 2%            |         |
| Brooklyn                                  | 18% | 3%        | <1%   | 74%      | 11%    | 1%            |         |
| Queens                                    | 6%  | <1%       | <1%   | 3%       | 59%    | 1%            |         |
| Staten Island                             | 8%  | <1%       | <1%   | 3%       | 0%     | 82%           |         |
| <b>ER (N=1,500)</b>                       |     |           |       |          |        |               |         |
| Manhattan                                 | 44% | 92%       | 28%   | 23%      | 26%    | 14%           | 0.000   |
| Bronx                                     | 28% | 4%        | 69%   | 4%       | 1%     | 3%            |         |
| Brooklyn                                  | 16% | 3%        | 1%    | 69%      | 10%    | 3%            |         |
| Queens                                    | 5%  | <1%       | <1%   | 2%       | 63%    | <1%           |         |
| Staten Island                             | 7%  | 0%        | <1%   | 2%       | 0%     | 79%           |         |
| <b>Outpatient (N=4,552)</b>               |     |           |       |          |        |               |         |
| Manhattan                                 | 55% | 95%       | 43%   | 56%      | 41%    | 22%           | 0.000   |
| Bronx                                     | 18% | 3%        | 54%   | 3%       | 4%     | 1%            |         |
| Brooklyn                                  | 16% | 2%        | 2%    | 59%      | 8%     | 3%            |         |
| Queens                                    | 6%  | <1%       | <1%   | 2%       | 47%    | <1%           |         |
| Staten Island                             | 5%  | <1%       | <1%   | 1%       | <1%    | 73%           |         |
| <b>Dental (N=1,445)</b>                   |     |           |       |          |        |               |         |
| Manhattan                                 | 48% | 91%       | 25%   | 29%      | 43%    | 6%            | 0.000   |
| Bronx                                     | 23% | 5%        | 70%   | 5%       | 10%    | 0%            |         |
| Brooklyn                                  | 16% | 2%        | 3%    | 64%      | 10%    | 2%            |         |
| Queens                                    | 3%  | 0%        | <1%   | 2%       | 38%    | 0%            |         |
| Staten Island                             | 9%  | 2%        | <1%   | <1%      | 0%     | 91%           |         |
| <b>Drug Treatment (N=843)</b>             |     |           |       |          |        |               |         |
| Manhattan                                 | 42% | 89%       | 30%   | 32%      | 28%    | 10%           | 0.000   |
| Bronx                                     | 29% | 5%        | 67%   | 2%       | 6%     | 2%            |         |
| Brooklyn                                  | 15% | 2%        | 2%    | 64%      | 13%    | 2%            |         |
| Queens                                    | 4%  | 1%        | 0%    | 2%       | 54%    | 0%            |         |
| Staten Island                             | 10% | 3%        | 1%    | 0%       | 0%     | 85%           |         |
| <b>Mental Health (N=1143)</b>             |     |           |       |          |        |               |         |
| Manhattan                                 | 60% | 95%       | 40%   | 49%      | 53%    | 20%           | 0.000   |
| Bronx                                     | 17% | 2%        | 57%   | <1%      | 2%     | 3%            |         |
| Brooklyn                                  | 11% | 2%        | 2%    | 47%      | 5%     | 0%            |         |
| Queens                                    | 4%  | <1%       | 2%    | 2%       | 40%    | 1%            |         |
| Staten Island                             | 7%  | <1%       | 0%    | <1%      | 0%     | 76%           |         |
| <b>Support Group (N=1318)</b>             |     |           |       |          |        |               |         |
| Manhattan                                 | 59% | 96%       | 45%   | 49%      | 50%    | 8%            | 0.000   |
| Bronx                                     | 19% | 2%        | 53%   | 3%       | 2%     | 2%            |         |
| Brooklyn                                  | 9%  | <1%       | <1%   | 46%      | 3%     | <1%           |         |
| Queens                                    | 3%  | <1%       | <1%   | 2%       | 44%    | 0%            |         |
| Staten Island                             | 11% | 1%        | <1%   | 0%       | 2%     | 89%           |         |
| <b>Special Medical Treatment (N=1829)</b> |     |           |       |          |        |               |         |
| Manhattan                                 | 67% | 94%       | 48%   | 49%      | 52%    | 20%           | 0.000   |
| Bronx                                     | 14% | 2%        | 50%   | 3%       | 7%     | <1%           |         |
| Brooklyn                                  | 13% | 2%        | 1%    | 46%      | 10%    | 3%            |         |
| Queens                                    | 2%  | <1%       | <1%   | 2%       | 30%    | 0%            |         |
| Staten Island                             | 6%  | <1%       | <1%   | <1%      | <1%    | 77%           |         |

**Appendix 4. Borough of Social Service Providers by Borough of Residence**

| Provider( Recipients                      | All | Manhattan | Bronx | Brooklyn | Queens | Staten Island | p-value |
|---|-----|-----------|-------|----------|--------|---------------|---------|
| <b>Housing Service (N=1150)</b>           |     |           |       |          |        |               |         |
| Manhattan                                 | 69% | 96%       | 61%   | 56%      | 52%    | 50%           | 0.000   |
| Bronx                                     | 15% | 2%        | 37%   | 2%       | 11%    | 0%            |         |
| Brooklyn                                  | 11% | 2%        | 2%    | 41%      | 13%    | 0%            |         |
| Queens                                    | 1%  | <1%       | 0%    | <1%      | 24%    | 1%            |         |
| Staten Island                             | 4%  | <1%       | <1%   | <1%      | 0%     | 49%           |         |
| <b>Financial Matters (N=774)</b>          |     |           |       |          |        |               |         |
| Manhattan                                 | 77% | 96%       | 65%   | 74%      | 58%    | 71%           | 0.000   |
| Bronx                                     | 11% | 2%        | 32%   | 3%       | 2%     | 0%            |         |
| Brooklyn                                  | 7%  | <1%       | 2%    | 22%      | 8%     | 0%            |         |
| Queens                                    | 3%  | <1%       | 0%    | 0%       | 32%    | 0%            |         |
| Staten Island                             | 3%  | 0%        | 1%    | 1%       | 0%     | 29%           |         |
| <b>Psychological Difficulties (N=570)</b> |     |           |       |          |        |               |         |
| Manhattan                                 | 73% | 95%       | 47%   | 59%      | 63%    | 25%           | 0.000   |
| Bronx                                     | 11% | 3%        | 52%   | 2%       | 0%     | 0%            |         |
| Brooklyn                                  | 8%  | 2%        | 1%    | 40%      | 0%     | 0%            |         |
| Queens                                    | 2%  | 0%        | 0%    | 0%       | 37%    | 0%            |         |
| Staten Island                             | 5%  | 0%        | 0%    | 0%       | 0%     | 75%           |         |
| <b>Food and Meals (N=470)</b>             |     |           |       |          |        |               |         |
| Manhattan                                 | 80% | 96%       | 73%   | 80%      | 75%    | 41%           | 0.000   |
| Bronx                                     | 7%  | 1%        | 24%   | 3%       | 5%     | 0%            |         |
| Brooklyn                                  | 4%  | 3%        | 3%    | 14%      | 0%     | 2%            |         |
| Queens                                    | 1%  | <1%       | 0%    | 0%       | 20%    | 0%            |         |
| Staten Island                             | 7%  | 0%        | 0%    | 3%       | 0%     | 57%           |         |