Tenant Well-being in New York/New York III Supportive Housing

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Summary and Rationale

As part of an ongoing evaluation of New York/New York III (NY/NY III) supportive housing, this report aims to characterize the well-being of tenants in the program. The report focuses on health and mortality, as well as educational, occupational and social engagement. Characterizing tenants' well-being is a key component in evaluating and improving the NY/NY III program.

Introduction

In 2005 New York City (NYC) and New York State committed to creating 9,000 units of supportive housing in an agreement called New York/New York III (NY/NY III). The goal of the agreement was to provide subsidized housing and support services to individuals and heads of families who:

- Were homeless or at risk of homelessness
- Had a mental illness, a substance use disorder or chronic illness
- Were aging out of foster care

Tenant placement began in 2007. Housing development will continue until at least through 2016. As part of an ongoing evaluation of NY/NY III, the Health Department analyzed data from a 2010 survey of program tenants. The analysis includes self-reported data on health and educational, occupational and social engagement. The Health Department also analyzed mortality among supportive housing tenants who moved into NY/NY III housing from 2007 through 2010.

This report addresses the following questions:

- What were the health, educational, occupational and social engagement characteristics of tenants who lived in NY/NY III supportive housing in 2010? How did they compare with the general NYC population?
- Which characteristics of supportive housing were associated with tenants' self-reported well-being?
- How did the mortality rates of the NY/NY III tenants compare with those who were eligible for the program but not placed in it?
- How did the mortality rates of the NY/NY III tenants compare with those of New Yorkers overall and of New Yorkers in the three lowest income neighborhoods in the city?
- What were the leading causes of death for NY/NY III tenants? How did the leading causes of death compare with those of unplaced applicants, New Yorkers overall and New Yorkers in the three lowest income neighborhoods?

Methods

Well-being

In 2010, the New York City Department of Health and Mental Hygiene (DOHMH) NY/NY III evaluation team mailed a paper-and-pencil survey to 2,277 NY/NY III tenants. The survey asked participants about their health, employment, educational activities and social engagement, among other questions. Participation was voluntary and a two-ride MetroCard was provided as an incentive. All tenants were sent a reminder postcard. The questionnaire was mailed up to two more times to tenants who did not initially respond. Sixty-one surveys were undeliverable, and were excluded from further analyses. The survey had a response rate of 57% (1,264 out of 2,216). Returned surveys were matched to the NY/NY III applicant list using first name, last name and housing provider of the respondent. After matching the surveys and applicants, the records were reviewed to ensure an exact match; 1,090 of 1,264 (86%) respondents were linked. Of that number, 50 were living in community care or transitional housing rather than NY/NY III housing; therefore they were not included in the analysis. The final number of survey respondents included in the analysis was 1,040.

Tenant well-being was measured by asking participants questions about their physical health (number of days with poor physical health in the past 30 days), mental health (number of days with poor mental health in the past 30 days), current smoking habits and current drug use. Additional measures of well-being included indices of educational

and occupational engagement. Indices were created using responses from participants who answered at least one of six questions assessing educational or occupational engagement. In particular, the occupational engagement questions asked 1) whether respondents currently had a paying job and 2) whether on a typical day they worked. Educational engagement questions asked 3) whether respondents were enrolled in an educational program, such as a GED program or college; 4) whether they were enrolled in a job skills or technical training program; 5) whether on a typical day they went to school; and 6) whether on a typical day they participated in a job training program. Social engagement was defined as respondents having answered affirmatively that on a typical day they visited family or friends or participated in programs such as support groups, day treatment or social activities.

The survey examined three main exposure variables, or variables potentially associated with outcomes of interest: length of tenancy (6 months or fewer, 7 to 12 months, 13 to 18 months or greater than 18 months), who the tenant was living with (living alone, living with roommates or living with family including spouse, partner or children), and support services (receiving needed services or not). Tenants' baseline demographic characteristics and population type were treated as potential confounders. Population types included: individuals with a serious mental illness and individuals with mental illness and a substance-use disorder; individuals with substance-use disorders; heads of families who had mental illness, substance use disorders, disabling medical conditions or HIV/AIDS; young adults aging out of foster care; and individuals with HIV and co-occurring serious mental illness or substance-use disorders. Language and race/ethnicity were statistically associated with service use and well-being indicators, and were included as potential confounders in the logistic regression. Duration of tenancy was statistically associated with whether a tenant lived alone, with roommates or with family, and with health indicators. Therefore, we included duration of tenancy as an additional confounder in the regression models, examining the relationship between health measures and whether tenants lived alone.

Statistical analysis of well-being

DOHMH calculated descriptive statistics to describe tenants' demographic characteristics and overall prevalence of well-being. For contextualization purposes, well-being outcomes were estimated for the general NYC adult population and determined to be different between the two if 95% confidence intervals (CI) did not overlap. DOHMH assessed bivariate associations between well-being outcomes and exposure variables and tenant characteristics using chi-square and independent t-tests. Lastly, separate logistic regression analyses were performed to evaluate associations between well-being outcomes and exposures after controlling for potential confounders. Missing data were excluded from all calculations of indices. Statistical significance was established if two-sided P values were <0.05. All analyses were performed using SAS v. 9.2.

Mortality

The evaluation team examined mortality among NY/NY III tenants, eligible applicants who were placed in the program and those eligible but not placed due to limited housing availability, using the following criteria (see Appendix I):

1. NY/NY III placed eligible applicants
    a. Those who moved in between January 1, 2007, and December 31, 2010
    b. Those who lived in supportive housing for more than seven days
2. NY/NY III unplaced eligible applicants
    a. Those who had an earliest eligibility determination date beginning on January 1, 2007, through December 31, 2010
    b. Those who were placed during the first six months of their eligibility in certain other government subsidized housing[1] were excluded from the study.

One exception is that people who were already living in other government-subsidized housing tracked by the evaluation team at the time of eligibility for the program were included in the analysis if they stayed in that housing for fewer than 180 days.

NY/NY III eligible applicants—both placed and unplaced—were probabilistically matched to NYC mortality data (see Appendix I). Characteristics of NY/NY III tenants from their first application to the NY/NY III supportive housing program were also included in the analysis.

[1] Other government-subsidized housing included housing in New York City that is meant to prevent homelessness among vulnerable populations. This housing is overseen by multiple City and State agencies.

Statistical analysis of mortality

The mortality rates for the supportive housing population were calculated by the direct method of age adjustment with the age distribution of the U.S. population in 2000, using data from the U.S. Census 2000. Rates were calculated per 100,000 person-years. Person-time for the NY/NY III participants (i.e., the denominator of the mortality rates) was calculated as beginning on the move-in date (for tenants), or date of first eligibility (for unplaced applicants), and ending at death or on December 31, 2011, whichever came first. People who died before their first date of eligibility were excluded from the analysis. Because of limited mortality data, three age categories were used for age adjustment: 18 to 44, 45 to 64 and 65 to 89. No one in the study population was older than 89.

DOHMH calculated age-adjusted mortality rates for people aged 18 to 89 in the three lowest income United Hospital Fund (UHF) neighborhoods of NYC[2], and for all New Yorkers aged 18 to 89. The three lowest income neighborhoods were identified as those with the highest percentages of residents living below the federal poverty level, based on the 2007-2011 American Community Survey (ACS). The three lowest income neighborhoods were Hunts Point-Mott Haven, Highbridge-Morrisania and Crotona-Tremont, all in the Bronx. The number of deaths in the three lowest income neighborhoods of NYC and in NYC as a whole for the years 2007 to 2011 were obtained from DOHMH's Office of Vital Statistics.

Standardized mortality ratios (SMR) were calculated to compare the mortality rates for tenants and unplaced applicants. SMRs are the ratio of observed deaths of the study population to the number of deaths that would be expected if the study population had the same mortality rate as the reference population. An SMR significantly different from 1 indicates a difference in mortality rates between the two populations. Poisson regression was used to calculate the CI.

To account for differences between placed NY/NY III tenants and unplaced eligible applicants, DOHMH conducted an analysis of survival by the Kaplan-Meier (KM) method, using an inverse of propensity scores. This KM method takes into account the fact that many subjects will still be alive at the end of the evaluation period. All statistical analyses of mortality were conducted using SAS v. 9.2.

[2] United Hospital Fund Staff (2002). New York City Community Health Atlas, 2002. Retrieved from: http://www.uhfnyc.org/publications/99007.

Results

Characteristics of NY/NY III Supportive Housing Survey Respondents in 2010

The majority of survey respondents (59%) were living in housing for individuals with an active substance-use disorder or housing for those receiving substance-use treatment (Table 1). Less than one-third of respondents were women. Length of tenancy was distributed almost evenly among respondents. Eighty-four percent of respondents reported English as their primary language. Sixty-nine percent of the tenants reported living alone, 20% lived with a roommate and 12% lived with a spouse, partner or children.

Table 1. Characteristics of NY/NY III Supportive Housing Tenants, 2010

	Number of Tenants	Percent of Tenants (95% Confidence Interval)
Population Group[a]		
Serious mental illness	239	23% (20-26%)
Substance use	612	59% (56-62%)
Family	99	10% (8-11%)
Young adults	38	4% (3-5%)
HIV	52	5% (4-6%)
Race/Ethnicity		
Latino[b]	333	36% (33-39%)
Black non-Latino	464	50% (47-53%)
White non-Latino	98	11% (9-13%)
Other non-Latino	35	4% (3-5%)
Gender		
Male	700	69% (66-72%)
Female	316	31% (28-34%)
Language		
English	791	84% (82-87%)
Non-English	146	16% (13-18%)
Tenancy		
≤6 months	237	24% (21-26%)
7-12 months	282	28% (25-31%)
13-18 months	235	23% (21-26%)
>18 months	251	25% (22-28%)
Residing		
Alone	689	69% (66-71%)
With roommate	196	20% (17-22%)
With spouse/partner/children	119	12% (10-14%)

[a] See Appendix II for description of the population groups.
[b] *Latino ethnicity defined as Hispanic or Latino of any race.*
Source: Well-being of NY/NY III Tenants Survey, 2010

Supportive Services

Survey respondents disclosed whether they needed assistance in various domains during the past 30 days and if they received assistance. In almost all 13 domains, more than half of the tenants who reported needing assistance said they received it. For example, more than 80% who needed help from a case manager at home or over the phone received it. Almost 80% reported receiving help managing medication or substance-use problems.

Table 2. Characteristics of NY/NY III Supportive Housing Tenants, 2010

Type of Assistance Needed	Number Needing Help	Percent who Received Assistance (95% Confidence Interval)
Help from case manager over the phone	283	84% (80-88%)
Help from case manager at home	223	82% (77-87%)
Help with a substance-use problem	116	79% (72-87%)
Help with managing medication	101	79% (71-87%)
Social services, such as food stamps	221	76% (70-82%)
Financial assistance, such as public assistance, Supplemental Security Income (SSI) or Social Security Disability (SSD)	299	67% (62-73%)
Dealing with upsets/crises	314	67% (62-72%)
Seeing a doctor for a physical health problem	234	66% (60-72%)
Seeing a doctor for a mental health problem	176	63% (55-70%)
Transportation to work, appointments or recreation	336	51% (45-56%)
Housework (e.g., cleaning)	132	50% (41-59%)
Managing or budgeting money	154	50% (42-58%)
Solving landlord problems	231	48% (42-55%)

Source: Well-being of NY/NY III Tenants Survey, 2010

Well-being of NY/NY III Tenants

The tenant survey measured self-reported overall health by assessing indicators of physical health, mental health, smoking, excessive alcohol consumption and drug use (Table 3). Compared with NYC residents overall, self-reported health measures among NY/NY III tenants were worse. For example, 29% of tenants reported having poor physical health in the past 30 days, compared with 10% of the general adult NYC population (see Table 3). Thirty-two percent of tenants reported poor mental health during the past 30 days, compared with 8% of adults in NYC overall, and 73% of tenants were current smokers, compared with 14% of NYC adults. Twenty-eight percent of tenants reported binge drinking, compared with 16% of NYC adults.

The tenant survey also measured educational, occupational and social engagement. There were fewer comparable indicators in the general NYC population to contextualize NY/NY III tenants' engagement. Overall, 30% of tenants reported participating in some type of education or training program. Twenty-one percent of tenants reported working. For NYC overall, approximately 56% of city residents were engaged in the labor force. Among NY/NY III tenants, 70% visited family or friends on a typical day and 64% engaged in other social programs or activities. Comparable data from NYC residents were not available for frequency of family or friend visits, social program engagement and education or training program participation.

Table 3. Well-being Characteristics of NY/NY III Tenants and General New York City Residents

	NY/NY III Tenants (2010 survey) (95% Confidence Interval)	General NYC Adult Population (95% Confidence Interval)
Health Characteristics		
Poor physical health on 14 or more of the past 30 days	29% (26-32%)	10%[1] (7-13%)
Poor mental health on 14 or more of the past 30 days	32% (29-35%)	8%[2] (7-9%)
Current smoking*	73% (70-76%)	14%[3] (13-15%)
Binge drinking**	28% (25-31%)	16%[3] (14–17%)
Drug use***	14% (12-17%)	16%[4,5,+]
Educational, Occupational and Social Engagement Characteristics		
Educational engagement^	30% (27-33%)	No comparable data
Occupational engagement◊	21% (18-24%)	56%[6] (55.78-55.82%)‡
Visiting family or friends on a typical day	70% (68-73%)	No comparable data
Participation in programs such as support groups, day treatment or social activities on a typical day	64% (61-67%)	No comparable data

Measures in Table 3:

* Current smoking for tenants was defined as smoking on some days or every day; it was defined for NYC as smoking at least 100 cigarettes in a lifetime and currently smoking on some days or every day.

** Binge drinking was defined for both tenants and NYC as having five or more drinks on one occasion. However, the NYC survey asked about the past 30 days while the tenant survey asked about frequency.

*** Drug use in the tenant survey was defined as any current use of drugs. The NYC estimate was based on use of drugs during the past year, and the list of drugs was slightly different.

^ In the tenant survey, educational engagement was defined as the tenant reporting attendance in school or at a job training program on a typical day or enrollment in an educational, job skills or technical training program.

◊ Occupational engagement in the tenant survey was defined as the tenant going to work on a typical day or having any type of paying job. The NYC estimate of occupational engagement was defined using ACS data by including individuals who were in the labor force (defined as civilian non-institutional population 16 years and older), and classified as employed (defined as persons who did any work for pay or profit; worked 15 hours or more as an unpaid worker in a family enterprise; were not working but had jobs or businesses from which they were temporarily absent for economic reasons; received pay for time off; or were seeking other jobs). This definition of employment status is used by the Department of Labor.[7]

\+ Confidence interval was not reported.

‡ Confidence interval was calculated from margin error provided.

Sources: Well-being of NY/NY III Tenants Survey, 2010; for NYC data in Table 3:

[1] *New York State Health Department. (2009). "New York State Exclusive of New York City, New York City, and New York state." New York State Expanded Behavioral Risk Factor Surveillance System. Retrieved November 25, 2014, from http://www.health.ny.gov/statistics/brfss/expanded/2009/county/docs/new_york_state_exclusive_of_new_york_city_new_york_city_new_york_state.pdf.*

[2] *New York City Department of Health and Mental Hygiene. "Epiquery: NYC Interactive Health Data System-Community Health Survey 2008." from http://nyc.gov/health/epiquery.*

[3] *New York City Department of Health and Mental Hygiene. "Epiquery: NYC Interactive Health Data System-Community Health Survey 2010." from http://nyc.gov/health/epiquery.*

[4] *Department of Health and Mental Hygiene. Prepared by Department of Health and Mental Hygiene: Paone D, Heller D, Olson C, Kerker B. Illicit Drug Use in New York City. NYC Vital Signs 2010, 9(1); 1–4.*

[5] *SubstanceAbuse and Mental Health Services Administration. (2006-2007). "ABUSEILL: Illicit Drug Abuse-Past Year." Retrieved December 2, 2014, from http://www.icpsr.umich.edu/icpsrweb/SAMHDA/ssvd/studies/34482/datasets/0001/variables/ABUSEILL.*

[6] *U.S. Census Bureau. (2010). "2010 American Community Survey 1-Year Estimates: Selected Economic Characteristics." Retrieved August 12, 2014.*

[7] *Bureau of Labor Statistics (2011) Labor Force Statistics from Current Population Survey. Retrieved April 4, 2016, from http://www.bls.gov/cps/lfcharacteristics.htm#emp.*

Associations with Well-being: Roommates, Length of Tenancy and Support Services

Living with Roommates and Association with Well-being

The odds of binge drinking were lower among tenants who lived with a roommate [Odds Ratio (OR)=0.64, CI=0.43-0.95] versus those who lived alone, even after adjusting for population type (Table 4). In addition, the odds of having a job were 1.91 times higher [CI=1.28-2.84] among those who lived with a roommate versus alone. The odds of participating in an education program were 1.94 times higher [CI=1.34-2.81] among those who lived with roommates compared with those who lived alone. No significant differences in well-being indicators were observed between tenants who lived with family members versus tenants who lived alone.

How to Interpret Table 4

Table 4 shows the results of logistic regression analyses used to assess whether there was an association between well-being and living with a roommate versus living alone, as well as the association between well-being and living with family members versus alone. The odds ratios (ORs) show the likelihood of well-being among tenants who had roommates compared with tenants who did not, and among tenants who lived with family members compared with those who did not. ORs greater than 1 indicate that tenants were more likely to engage in the outcome. Conversely, ORs less than 1 indicate that tenants were less likely to engage in the outcome. Confidence intervals that do not overlap with 1 indicate that the association was statistically significant, or not due to chance. All regression analyses controlled for tenants' population type. Some also controlled for duration of tenancy.

Table 4. Adjusted Odds Ratios of Well-being Characteristics and Living with Roommates, Family or Alone among NY/NY III Tenants, 2010

Outcome	Group Comparisons	Adjusted Odds Ratio	95% Confidence Interval
Binge drinking[a]	Living with roommates vs. alone	0.64	0.43-0.95
	Living with family vs. alone	1.96	0.86-4.46
Educational engagement[b]	Living with roommates vs. alone	1.94	1.34-2.81
	Living with family vs. alone	1.47	0.57-3.81
Occupational engagement[a]	Living with roommates vs. alone	1.91	1.28-2.84
	Living with family vs. alone	1.64	0.61-4.42

[a] Adjusted for population type (serious mental illness, substance use, family, young adults and individuals with HIV).
[b] Adjusted for population type and tenancy.
Source: Well-being of NY/NY III Tenants Survey, 2010

Length of Tenancy

The odds of tenants participating in programs such as support groups, day treatment and social activities were lower for those living in NY/NY III housing for more than six months, compared with those living in program housing for six months or fewer.

Receiving Needed Support Services

Results suggest an overall positive association between receiving needed services and measures of well-being (Table 6). For example, the odds of better physical health were higher among those who received needed financial assistance, compared with those who did not receive it [OR=2.08, CI=1.15-3.76]. The odds of better mental health were also higher among those who received needed financial assistance [OR=2.16, CI=1.22-3.82] and a case manager home visit [OR=4.13, CI=1.72-9.89], compared with tenants who did not receive needed assistance. In both of these cases, better physical and mental health were self-reported. The odds of participating in social programs, visiting family and attending school or vocational training were also higher among individuals who received needed assistance.

How to Interpret Table 5

Table 5 shows the results of logistic regression analyses used to assess whether there was an association between length of tenancy in NY/NY III and participation in programs. The odds ratios show the likelihood of program participation among tenants who lived in NY/NY III housing for more than six months, compared with those who lived in the program housing for a shorter amount of time. Odds ratios less than 1 indicate that tenants were less likely to participate in groups. Conversely, ORs more than 1 indicate that tenants were more likely to participate in groups. Confidence intervals that do not overlap with 1 indicate that the association was statistically significant, or not due to chance. The regression analysis controlled for tenants' population type.

Table 5. Adjusted Odds Ratio of Well-being Characteristics by Length of Tenancy among NY/NY III Tenants, 2010

Outcome	Group Comparisons	Adjusted Odds Ratio	95% Confidence Interval
Program participation (e.g., support groups, day treatment and social activities)[a]	7-12 months vs. 6 months or less	0.56	0.38-0.84
	13-18 months vs. 6 months or less	0.51	0.34-0.78
	More than 18 months vs. 6 months or less	0.50	0.33-0.74

[a] Adjusted for population type (serious mental illness, substance use, family, young adults and individuals with HIV).
Source: Well-being of NY/NY III Tenants Survey, 2010

How to Interpret Table 6

Table 6 shows the results of logistic regression analyses of the association between tenants who received needed assistance and well-being characteristics. The odds ratios show the likelihood of well-being among tenants whose needs were met compared with tenants whose needs were not. Odds ratios greater than 1 indicate that tenants who had their needs met had greater well-being. Confidence intervals that do not overlap with 1 indicate that the association is statistically significant, or not due to chance. All regression analyses controlled for tenants' population type. Some also controlled for language and ethnicity.

Table 6. Receiving Needed Assistance and Well-being Characteristics among NY/NY III Tenants, 2010

Well-being Characteristics	Type of Needed Assistance Received	Adjusted Odds Ratio	95% Confidence Interval
Better physical health—did not report poor physical health on at least 14 of the last 30 days	Financial assistance[b]	2.08	1.15-3.76
Better mental health—did not report poor mental health on at least 14 of the last 30 days	Financial assistance[b]	2.16	1.22-3.82
	Help from case manager at home[b]	4.13	1.72-9.89
Having a job	Getting social services such as food stamps[a]	0.41	0.19-0.89
Attending school or vocational training	Solving problems with the landlord[c]	2.70	1.35-5.40
Visiting family on a typical day	Help from case manager by phone[a]	4.04	2.06-7.95
	Help from case manager at home[a]	3.31	1.57-6.98
Participating in programs	Financial assistance[a]	1.74	1.03-2.95
	Dealing with upsets or crises[a]	2.59	1.54-4.34
	Transportation[d]	2.22	1.36-3.62
	Help from case manager by phone[a]	3.16	1.62-6.19

[a] Adjusted for population type (serious mental illness, substance use, family, young adults and individuals with HIV).
[b] Adjusted for population type and language.
[c] Adjusted for population type and ethnicity.
[d] Adjusted for population type and duration of tenancy.
Source: Well-being of NY/NY III Tenants Survey, 2010

Mortality Among Persons Eligible for NY/NY III Housing 2007 to 2010

DOHMH studied 3,147 tenants placed in NY/NY III supportive housing from 2007 through 2010, and 6,217 unplaced applicants. Among placed tenants, 73% were male; among unplaced applicants, 69% were male (Table 7). Among placed tenants, the majority, 57%, were 45-64 years old. Among unplaced applicants, 50% were in that age range.

Table 7. Characteristics of NY/NY III Tenants and Unplaced Eligible Applicants, 2007-2010

	Tenants (N=3,147)	Percent of All Tenants (95% Confidence Interval)	Unplaced Applicants (N=6,217)	Percent of All Unplaced Applicants (95% Confidence Interval)	Total Tenants and Unplaced Applicants (N=9,364)
Population Group					
Serious mental illness	795	25% (24-27%)	3,655	59% (58-60%)	4,450
Substance use	1,440	46% (44-48%)	1,699	27% (26-28%)	3,139
Family	174	6% (5-6%)	338	5% (4-6%)	512
Young adults	243	8% (7-9%)	580	9% (9-10%)	823
HIV/AIDS	500	16% (15-17%)	337	5% (5-6%)	837
Race/Ethnicity					
Latino	930	30% (28-31%)	1,729	28% (27-29%)	2,659
Black non-Latino	1,795	57% (55-59%)	3,327	54% (52-55%)	5,122
White non-Latino	341	11% (10-12%)	965	16% (15-16%)	1,306
Other non-Latino	81	3% (2-3%)	196	3% (3-4%)	277
Age Groups					
18-44	1,254	40% (38-42%)	2,933	47% (46-48%)	4,187
45-64	1,808	57% (56-59%)	3,080	50% (48-51%)	4,888
65 and older	85	3% (2-3%)	204	3% (3-4%)	289
Gender					
Male	2,302	73% (72-75%)	4,298	69% (68-70%)	6,600
Female	845	27% (25-28%)	1,919	31% (30-32%)	2,764

Table 7 (*cont'd*). Characteristics of NY/NY III Tenants and Unplaced Eligible Applicants, 2007-2010

	Tenants (N=3,147)	Percent of All Tenants (95% Confidence Interval)	Unplaced Applicants (N=6,217)	Percent of All Unplaced Applicants (95% Confidence Interval)	Total Tenants and Unplaced Applicants (N=9,364)
Language					
English	2,850	91% (90-92%)	5,663	91% (90-92%)	8,513
Non-English	297	9% (8-11%)	554	9% (8-10%)	851
Time—*between move-in or initial eligibility and end of evaluation period or death*					
6 months or less	26	1% (0.5-1%)	44	1% (0.5-1%)	70
7-12 months	29	1% (0.6-1.3%)	33	0.5% (0.4-0.7%)	62
13-18 months	336	11% (10-12%)	749	12% (11-13%)	1,088
Longer than 18 months	2,756	88% (86-89%)	5,391	87% (86-88%)	8,147
Clinical characteristics					
Proportion of applicants with at least one severe condition	1,318	42% (40-44%)	2,079	36% (35-37%)	3,397
Mean number of severe conditions among all applicants	0.530 (0.504, 0.554)		0.428 (0.411, 0.445)		9,364
Mean number of severe conditions for those with at least one severe condition	1.266 (1.236, 1.296)		1.278 (1.254, 1.303)		
Any mental illness or substance use disorder [a]	2,838	90% (89-91%)	5,911	68% (67-69%)	8,749
Any substance use disorder[b]	2,254	72% (70-73%)	3,491	56% (55-57%)	5,756

Notes

[a] Any mental illness or substance use disorders include any Axis I or Axis II code other than 79990.

[b] Any substance use disorders are defined by Axis I or Axis II codes or frequencies of substance use at the time of NY/NY III application.

Source: NYC Department of Homeless Services, NYC Department of Correction, NYC Department of Health and Mental Hygiene, NYC Human Resources Administration and within it Customized Assistance Services and the NYC HIV/AIDS services Administration, and New York State Office of Mental Health

Age-Standardized Mortality Rates

Among the 3,147 placed tenants, 120 (4%) died in the four-year follow-up period. During the same period, among the 6,217 people eligible for NY/NY III but not placed, 236 (4%) died. Table 8 shows the mean number of deaths per year, the age-adjusted mortality rates and their confidence intervals. The confidence intervals overlap for the NY/NY III tenants and the eligible unplaced applicants. Therefore, there was no statistically significant difference in mortality rates between the placed and unplaced NY/NY III applicants. In addition, the confidence intervals overlap for tenants and unplaced applicants with those of the three lowest income neighborhoods in NYC. However, the rate of death among both NY/NY III placed and unplaced people was higher than NYC's overall rate.

Table 8. Comparison of Age-Adjusted Mortality Rates per 100,000 Person-Years, 2007-2011

	Mean Number of Deaths per Year	Age-Adjusted Mortality Rate per 100,000 Person-years^	95% Confidence Interval
NY/NY III tenants	24	1,784*	783-3,831
NY/NY III unplaced eligible applicants	47	1,425	886-2,303
Three lowest-income NYC neighborhoods[a]	2,641	871	837-906
New York City overall	40,467	695	689-702

[a] Hunts Point-Mott Haven, Highbridge-Morrisania and Crotona-Tremont

^ Numbers in the above table are age-adjusted by the direct method, using the US Census 2010 population as a reference.

* Estimate should be interpreted with caution. Relative standard error (a measure of estimate precision) is greater than 30% or the sample size is too small, making the estimate potentially unreliable.

Source for NY/NY III tenants and unplaced eligible applicants: Records of NYC Human Resources Administration, Customized Assistance Services, 2007-2010, matched to DOHMH Office of Vital statistics death records, 2007-2011

Source for the three lowest income neighborhoods and for New York City: DOHMH Office of Vital Statistics death records, 2007-2011; American Community Survey, 2007-2011

Source for the reference population used for age adjustment: The US 2010 Decennial Census, both men and women together

Standardized Mortality Ratios and Survival Analysis by the Kaplan-Meier Method

DOHMH used standardized mortality ratios to compare the relative mortality of placed NY/NY III tenants and unplaced eligible applicants. The results indicate that none of the mortality differences were statistically significant, which is consistent with the data in Table 8. According to the analysis, there was a slightly higher probability of survival among the placed population compared with the unplaced population (94% vs. 92%); however, this difference was not statistically significant. To account for the probability of being chosen for the treatment group or the control group (propensity score), DOHMH also conducted the Kaplan-Meier analysis using inverse propensity scores for all other factors that characterized participants in the program. There was no significant difference between tenants and unplaced applicants.

There was also no statistically significant difference in mortality rates between NY/NY III tenants and unplaced applicants in all-cause mortality rates.

Cause-Specific Rates of Mortality

The causes of death among tenants and unplaced applicants were analyzed using cause-specific mortality rates. For both the placed and unplaced NY/NY III applicants, the leading causes of death were heart disease, cancer, HIV and accidental poisonings by psychotropic substances. However, the rate of death due to some of these causes produced high standard errors, and therefore some of the estimates were not reliable.

Discussion

NY/NY III Program Factors Associated with Well-being

Several factors were associated with NY/NY III tenants' well-being. First, having a roommate was associated with reduced odds of binge drinking, increased odds of having a job and increased odds of participating in education programs. This is an important finding because it points to the possible benefits of roommates in the NY/NY III program. Some have speculated that having roommates may be negatively associated with mental health due to potential conflicts[3]. However, one study of supportive housing in Toronto found that tenants experienced social isolation after moving into independent housing; social isolation sometimes resulted in loneliness, which sometimes led to substance use[4].

A second factor associated with tenants' well-being was length of tenancy. Tenants living in the program for fewer than six months were more likely to participate in programs that promote well-being, such as support groups, day treatment and social activities. This finding points to the importance of reengaging tenants in programs after they have settled into supportive housing (i.e., after six months). Studies of supportive housing have found that feelings of isolation increase with longer duration of stay[5,6]. Participating in programs can mitigate isolation.

A third factor associated with positive well-being is receiving needed services. Receiving needed services is associated with better physical and mental health, as well as participation in social programs, visits with family and participation in school or vocational training.

Survey Strengths and Limitations

The tenant survey had many strengths. It had a high response rate, it asked a wide range of questions about various elements of the program and it illuminated experiences and perceptions of the program that could not otherwise be described from administrative data. However, there were also several limitations. First, tenants who responded to the survey may have had unmeasured differences compared with those who did not answer the survey. Second, there is no way to know if the characteristics and benefits associated with having a roommate might be due to these unmeasured differences. Third, survey respondents may not represent the most recent NY/NY III tenant population because the survey was conducted during the early phase of program implementation.

There were also limitations to the mortality analysis. First, there was a small number of deaths among NY/NY III eligible applicants during the years included in the analysis. It is possible that with additional years of data, differences between placed and unplaced eligible applicants might emerge and more could be learned about causes of death. A second limitation is that applicant and tenant deaths that occurred outside of NYC were not included in the data. Despite these limitations, this analysis was strengthened by its utilization of probabilistic data linkage. All NY/NY III eligible applicants were linked to the NYC mortality registry, thus providing a comprehensive view of mortality in this population.

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[3] Kyle, T. and J.R. Dunn, Effects of housing circumstances on health, quality of life and health care use for people with severe mental illness: a review. Health Soc Care Community, 2008. 16(1): p. 1-15.

[4] Stergiopoulos, V., et al., Housing First: exploring participants' early support needs. BMC Health Serv Res, 2014. 14: p. 167.

[5] Siegel, C.E., et al., Tenant outcomes in supported housing and community residences in New York City. Psychiatr Serv, 2006. 57(7): p. 982-91.

[6] Arthur Andersen LLP, Program Evaluation Report, Connecticut Supportive Housing Demonstration Program, 2002, University of Pennsylvania Health System, Department of Psychiatry, Center for Mental Health Policy and Service Research.

Appendix I

The method of selecting individuals for inclusion in the mortality section of the report was based on a modified intention-to-treat approach.

To be included in the mortality analysis, a placed tenant must have first moved in between January 1, 2007, and December 31, 2010. An unplaced applicant must have had a first eligibility date between January 1, 2007, and December 31, 2010. A person selected for the study who lived until at least December 31, 2010, had a full two years of follow-up in the program. Only tenants whose linked administrative data indicated that there was no death date prior to their earliest move-in or eligibility date were included in the analysis. People placed in NY/NY III supportive housing must have lived there for more than seven days to be included in the analysis. Those who were placed during the first six months of their eligibility in certain other government subsidized housing were excluded from the study. One exception is that people who were already living in other government-subsidized housing tracked by the evaluation team at the time of eligibility for the program were included in the analysis if they stayed in that housing for fewer than 180 days.

Mortality records from the Office of Vital Statistics, based on death certificates, were probabilistically matched to NY/NY III participant records from participating agencies. The first name, last name, date of birth and Social Security number of each participant was matched, along with additional available elements unique to each data source.

Appendix II

Description of the categories used in Tables 1 and 7

1. The serious mental illness category consists of people living in NY/NY III supportive housing with a serious mental illness or mental illness and a co-occurring substance use disorder, as well as individuals coming from state psychiatric facilities.
2. The substance use category includes individuals who were chronically homeless single adults who had a substance use disorder or who had been treated for a substance use disorder.
3. The family category includes heads of families who had mental illness, a substance use disorder, a disabling medical condition or HIV/AIDS.
4. The young adult category includes young adults who had exited from foster care and were at risk of homelessness.
5. The HIV category includes people who had HIV/AIDS and serious mental illness or a substance use disorder.

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