NYC CHAIN REPORT 2018-2

Housing Need, Housing Assistance, and Engagement with HIV Medical Care

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Introduction

There is strong evidence that stable, affordable, quality housing in a positive residential environment is essential for effective management of HIV. Unstable, inadequate, or unaffordable housing situations are associated with poor engagement with HIV care, and failure to achieve or sustain viral suppression (Aidala et al., 2016; Milloy et al., 2012; Parashar, 2016). The importance of housing status for HIV prevention and care has been increasingly recognized, as a social determinant of health – a contextual or structural factor affecting risk for and consequence of HIV infection. Housing occupies a strategic position as an intermediate structural factor, linking "upstream" economic, social, and cultural determinants to the more immediate physical and social environments in which we carry out our day-to-day lives (Aidala & Sumartojo, 2007; CDC, 2018).

The importance of housing/ lack of housing for engagement in care and the health and wellbeing of persons living with HIV (PLWH) has been the topic of multiple Community Health & Information Network (CHAIN) reports since the early 1990s, most extensively investigated in a 2006 report (CHAIN 2006-5) and 2007 publication in a special issue of AIDS & Behavior (Aidala et al. 2007). However, the challenges of securing and maintaining housing have only increased in recent years. Most persons living with HIV face considerable challenges to maintaining regular employment that would provide income sufficient to cover housing costs in jurisdictions such as New York where affordable housing is increasingly scarce. The Fair Market Rent (FMR) is an amount determined by the U.S. Dept. of Housing and Urban Development (HUD) to be the cost of modest rental units in specific market areas. The FMR for a studio apartment in the New York metro is currently more than $1,500/month (HUDuser.gov, 2018). As a comparison, monthly Supplemental Security Income (SSI) payments for an individual in New York is $771 and the average SSDI benefit is $1,000 to $1,200 per month (NYS.gov, Disability Programs); recent data from the Medical Monitoring Project (NYC.gov, 2017) indicates that household income from all sources for 60% of PLWH in care in NYC is below the federal poverty level (well below $1500 per month).

Over the same time period, there have been changes in the program and policy context that have potentially increased resources to address housing needs among persons with HIV and other chronic health conditions. The Affordable Care Act (ACA), signed into law in 2010, provides funding for patient-centered models of care emphasizing coordination across medical specialties and support services. PLWH who are Medicaid beneficiaries are eligible for Health Homes which coordinate provider networks to provide wrap-around services to mitigate life circumstances compromising health, including help with housing (AIDS.gov, 2018; NYSDOH 2019). Since 2011, NY State Medicaid Redesign Team (MRT) includes a supportive housing initiative which invests in housing as a social determinant of health for high-need Medicaid recipients. Persons with HIV are considered a priority population under the initiative. In 2015, the IRS specified that contributions to housing could be considered as a "community benefit" under provisions that non-profit hospitals contribute some of their revenue for charity care to maintain their non-profit status, which opened up additional funding to housing development (Bamberger et al. 2017). Specific to New York City, the HIV/AIDS Services Administration (HASA), the main provider of public

benefits to PLWH, which previously provided benefits only to "symptomatic" PLWH, changed eligibility requirements for receiving housing assistance in 2016 to include all HIV-positive New Yorkers who meet income requirements.

The purpose of the present report is to update and expand the 2007 investigation of housing and access to and maintenance in HIV medical care among PLWH in New York. Specific research questions are: 1.) What is the prevalence of housing instability and need for housing assistance among PLWH in New York City and have rates changed over time? 2.) What is the relationship between housing status and engagement with HIV medical care and adherent ARV use? 3.) Does receipt of housing assistance have an effect on health care utilization, continuity of care, and entry/reentry into care after period of non-adherence to medical visits and/or ARV treatment recommendations? 4) What is the association of housing need and receipt of housing assistance with viral load suppression and sustained suppression?

Key Findings

- The need for housing assistance among persons living with HIV/AIDS has not diminished over time. Considering the period from 2002 to 2015, at every interview period, approximately 80% of all CHAIN study participants needed housing assistance. This includes individuals currently receiving and depending on some form of housing assistance as well as those with unmet need.

- Cross-sectional trend data indicate there has been a reduction in housing service 'gaps' – the percentage of study participants who were homeless or unstably housed, unable to pay rent or experiencing other housing problems but did not receive any type of housing assistance or services to address needs. Although service gaps have fluctuated, since 2012 compared to earlier time periods, fewer individuals needing housing services did not get any services or housing assistance at all.

- There is a strong and consistent relationship between housing need and connection to HIV medical care. Housing need is associated with not receiving appropriate care that meets minimum clinical practice standards with regard to regular appointments, tests, and procedures. Housing need is a predictor of multiple missed appointments or dropping out of care entirely for six months or more, and non-adherent ARV use.

- Need for housing assistance is a barrier to entry into appropriate care, continuous care, and adherent ARV use after a period of no or lack of appropriate care, as well as a barrier to maintaining consistent engagement with care and medication adherence over time.

- Receipt of housing assistance is associated with receiving appropriate care, entry into and sustained appropriate care. Housing assistance is associated with adherent ARV use and sustained adherent ARV use, controlling for a range of client demographic and behavioral health characteristics as well as other service needs, and services received.

- Housing need is negatively associated with viral suppression in cross-sectional analyses and with achieving and maintaining suppression in over-time models. Receipt of housing assistance is positively associated with viral suppression but not statistically significant in adjusted models.

- Many PLWH with housing needs have multiple additional service needs that are associated with poor engagement with care, indicating the importance of assessment and services to address food insecurity, transportation needs, treatment for substance use, and/or mental health challenges. Housing assistance holds promise for improving engagement in care but may be less effective if focused solely on providing housing without addressing the array of supportive services that clients need to remain adherent to treatment regimen and sustain viral suppression.

- Results from longitudinal analyses pooling data from CHAIN cohorts interviewed in 2002-2015 are comparable to findings from the earlier analyses based on study participants interviewed in 1994 through 2003 and show a strong and consistent relationship between housing need and increased risk for poor engagement in HIV medical care, lack of adherent ARV use, and lack of sustained viral suppression. Consistent with the increased recognition of need for housing and other supportive services within integrated medical care systems, the current study indicates the importance of wrap-around services to address multiple needs and co-occurring conditions for sustained engagement in HIV medical care and positive individual and community health outcomes.

Methods

Sample

This report is based on information provided by interviews conducted with cohorts enrolled in 2002-2004 and 2009-2011 as part of the Community Health Advisory & Information Network (CHAIN) Project, an ongoing cohort study of persons living with HIV and AIDS in New York City. Each cohort includes members recruited from among clients of health and social service agencies recruited through a two-stage stratified sampling strategy designed to enroll a representative sample of HIV positive individuals, age 20 and older, who had some contact with the service system within the past 12 months. A listing was compiled of known HIV service providers, and equal numbers of medical and social service sites were randomly sampled. Staff in selected agencies assisted with recruitment of a random sample of clients, proportional to total client enrollment, either drawn from agency rosters or using sequential enrollment procedures.

The current study is based on 4,649 interviews conducted between 2002 and 2017 with 1,012 individual PLWH (693 recruited in 2002-2004 and 319 recruited in 2009-2011). Follow-up interviews were conducted approximately every 12-18 months with 80% or more of eligible participants. The average number of interviews completed per person was 3.5.

The CHAIN Project collects information on multiple aspects of an individual's life, including detailed housing status, use of social and medical services, as well as sociodemographic, behavioral and well-being measures relevant to need for these services. Study variables for this analysis were chosen based on the theoretical and empirical evidence suggesting the variable has an effect on access to and retention in HIV medical care as well as HIV health outcomes.

Housing measures

In order to encompass the multiple aspects of housing that may affect connection to HIV medical care and outcomes, we use an indicator that reflects both 'objective' housing status regarding adequacy and stability of living arrangements, and 'subjective' experience of housing problems and respondent reported need for housing assistance. At each interview, participants are asked a series of question about their current and recent (past 6 months) housing and living arrangements. A separate set of questions asks about housing problems or the need for assistance in the area of housing, the nature of the problem, and whether or not any services or assistance was received to resolve housing need.   Self-reported housing problem is a broader category than current housing status since individuals can be currently housed but facing housing loss due to inability to pay rent; facing eviction for any number of tenant or landlord reasons; being discharged from a residential program with no resources to secure housing; being in an intolerable or unhealthy situation due to domestic violence or other dangers; or lacking basic services such as heat and hot water.

"Housing Need" for the current analysis is indicated by: Housing status currently or in the past 6 months as homeless (individuals describe their living arrangements as sleeping in a drop-in center or shelter for homeless persons, SRO or welfare hotel with no services, on the street or other place not meant for sleeping) or unstably housed (not currently in permanent housing but not literally homeless, including those in a transitional housing program, in AOD treatment housing with no other address, or temporarily doubled up with friends or family); OR seriously rent burdened (report difficulty paying rent in the past six months or insufficient income to secure housing indicated by FMR>50% of income); OR needing help or assistance in the area of housing in the past 6 months to obtain stable, secure, appropriate housing, address habitability issues (e.g. no heat or hot water), leave domestic violence or unsafe housing, or avoid eviction or other housing loss.

"Housing Assistance or Services" is indicated by receipt of permanent tenant-based (e.g. HOPWA or Section 8 voucher) or facility-based (e.g. congregate permanent supportive housing, public housing) assistance with housing costs, or participant report that within the past 6 months he or she received 'practical help' for a housing problem from an agency or paid provider in the form of direct assistance with obtaining housing (e.g., provision of housing, housing placement assistance), application for housing assistance, or a service referral, that resolved need or problem or made "some" or "a great deal" of progress with resolving their housing problem or need.

HIV medical care outcome measures

The outcome measures for this study are selected to indicate care continuum markers of positive engagement in HIV medical care and viral load outcomes. For each indicator, we consider a

current status indicator (e.g. receiving appropriate care that meets clinical practice standards, virally suppressed), entry into the positive outcome status (e.g. entry into appropriate care after a period of not being in appropriate care, being virally suppressed after a period of being unsuppressed); and sustained positive outcome status (e.g. sustained appropriate care or sustained viral suppression across multiple interview periods).

"Consistent Care" is an indicator of retention in care indicated by the absence of missed scheduled appointments or intentional gaps in care for 6 months or more (see e.g. Mugavero et al. 2012). This variable is based on visits for medical care, regardless of the level or type of clinical services reported

 "Appropriate Care." The next analyses examine receipt of HIV medical care that meets minimum clinical practice standards at the time of interview. Prior to 2013, minimum standard for appropriate care required at least one visit with blood work and a complete physical in the past 6 months if CD4 count is 350 or above and viral load is 400 or less; or at least 2 visits with at least one blood work and one complete physical if the CD4 count is less than 350 or viral load is over 400. After June 2013, minimum standards for appropriate care for anyone diagnosed with HIV must include taking ARV, regardless of CD4 or viral load. Our measure of 'appropriate care' is meant to indicate a level of individual engagement and follow-through with care recommendations, based on HHS HIV/AIDS Bureau (HAB) criteria for minimum clinical standards of care (HAB.HRSA.gov) and NIH AIDSInfo guidelines (AIDSinfo.nih.gov)

"Adherent ARV Use." Adherent antiretroviral medication use is indicated by taking any recommended ARV regimen prescribed by a physician and adherence to medication regimen indicated by reports of taking medications "exactly as prescribed, almost never missing a dose" and not missing any medications in the two days preceding the interview. Not adherent to recommended ARV regimen includes those who are not taking any antiretroviral medication and those who report taking medications not consistent with DHHS's guidelines in effect at the time of the interview (AIDSinfo.nih.gov).

"Suppressed Viral Load." Viral load suppression is based on self-reported most recent HIV viral load as a numerical value below a reliably detectable cut point at the time (<400 copies 2002-2008; <200 2009 or after), or when medical provider reported viral load test results as "undetectable," or, in a few cases, simply as "good." Viral load test results above the cut point, or provider reported results as either 'detectable' or 'bad' were classified as unsuppressed viral load. Note that fewer than 1% of cases were classified based only on good/bad designation.

Definitions of housing variables and all outcome indicators are summarized in Table 1.

Co-occurring needs and services received

Problem substance use is indicated by any use of heroin, cocaine, crack, methamphetamine or problem drinking as indicated by the CAGE instrument (Ewing 1984) or drinking five or more drinks weekly or more often. Timing of problem substance use is defined as currently or within 6 months of interview, prior to 6 months ago, or never. AOD services include any type of professional treatment in the past 6 months excluding self-help groups such as AA/NA.

Table 1. Measures – Variable Definitions

Variable	Definition
Housing Variables	
Housing Need	Homeless (sleeping in a drop-in center or homeless shelter, a limited-stay SRO or welfare hotel with no services, on the street or other place not meant for sleeping) or unstably housed (not currently in permanent housing but not literally homeless, including those in a transitional housing program, in AOD treatment housing with no other address, or temporarily doubled up with friends or family) during the past 6 months; OR rent burdened (report difficulty paying rent in past six months or having insufficient income to secure housing as indicated by FMR>50% of income); OR report needing help or assistance in area of housing in the past 6 months to obtain stable, secure, appropriate housing, address habitability issues (e.g. no heat, damaged wiring), leave domestic violence or unsafe situation, or avoid eviction or other housing loss
Housing Assistance	Received tenant-based or facility-based permanent rental assistance OR received ''practical' housing assistance in the past 6 months that resolved need or problem or made "some" or "a great deal" of progress with resolving housing needs
HIV Care Outcomes	
Consistent Care	Absence of 2+ missed scheduled appointments for HIV medical care during the past 6 months, AND did not have a period of 'drop out'— intentionally stopped going to the doctor and had no HIV medical appointments for 6 months or more, since last interview.
Entry to Consistent Care	Not having consistent care in the previous interview but having consistent care in the following interview
Continuous Consistent Care	Having consistent care in two consecutive interviews
Appropriate Care	Meeting the minimum clinical practice standards at the time of interview. Prior to 2013, at least one visit with blood work and complete physical in the past 6 months if CD4 count is 350 or above and viral load is 400 or less; or at least 2 visits with at least one blood work and one complete physical if CD4 count is less than 350 or viral load is over 400. After June 2013, care is not appropriate if not taking ARV, regardless of CD4 or viral load.
Entry to Appropriate Care	Not having appropriate care in the previous interview but having appropriate care in the following interview
Continuous Appropriated Care	Having appropriate care in two consecutive interviews

Table 1. Measures – Variable Definitions

Variable	Definition
Adherent ARV Use	Adherent ARV indicated by taking any recommended ARV regimen and participant report of taking medications "exactly as prescribed, almost never missing a dose" and not missing any medications in the two days preceding the interview. Not adherent to recommended ARV regimen includes those who are not taking any antiretroviral medications and those taking medications not consistent with DHHS's guidelines in effect at the time of the interview (NIH, AIDSinfo.nih.gov).
Entry to Adherent ARV Use	Not meeting criteria for Adherent ARV use in the previous interview but having Adherent ARV use in the following interview
Continuous Adherent ARV Use	Adherent ARV use in two consecutive interviews
Viral Suppression	Self-reported most recent HIV viral load as an actual numerical value or report medical provider designation as "undetectable," or "good." Viral load of <400 copies (or <200 copies from November 2009 and after), or provider report as "undetectable," or "good" were coded as "suppressed viral load" and >400 copies (or >200 copies from November 2009 and after) or reported as "bad" as "unsuppressed viral load."
Entry to Viral Suppression	Unsuppressed viral load in the previous interview but having suppressed viral load in the following interview
Continuous Viral Suppression	Having suppressed viral load in two consecutive interviews

Low mental health functioning is indicated by the Mental Component Summary Score (MCS) of the MOS-SF36 (McHorney et al. 1993); following established clinical cut points, individuals with scores below 37.0, the mean score seen in psychiatric inpatient populations, were categorized as having very low mental health functioning. Mental health services in the past six months include counseling or treatment from a licensed mental health care professional or clinical social worker. Food insecurity is indicated by any of the following: reporting not enough money for food that the individual or family needs 'sometimes' to 'very often' in the past 6 months; or 'sometimes/often' there is not enough to eat; or the participant has gone a whole day without eating in the last 30 days; or they report need for services or help with food, groceries, or meals in the past 6 month. . Food/nutrition services includes one or more of the following services in the last six months: meals provided in a group setting, prepared meals delivered to home, receipt of food voucher, or food from a food pantry. Transportation needs are indicated by self-reported need for transportation assistance, or report that a lack of transportation resulted in delayed or missed medical or social services in the past six months. Transportation services are any assistance with transportation needs by an agency provider including transportation vouchers (e.g. MetroCards) or ride services (e.g. Access-a-Ride).

Receipt of <u>medical case management</u> is indicated by reporting receiving assistance from a case manager in the past six months with access or referrals to specific medical services or with receiving or being referred for help with taking ARV medication. <u>Social services case management</u> indicates receiving one or more of the following services from a case manager in the last six months: care plan development or revision for dealing with needs, or help with access or referrals to specific social services or filling out forms for benefits or entitlements. Note that the measure is based on participant reported types of services received, not on classifying *types of case managers* or case management programs. The same case manager may be providing both medical case management and assistance with social service needs.

Covariates

A number of covariates were included in the multivariate analyses, to control for individual characteristics and contextual factors that other research has shown to affect use of HIV services. Models control for socio-demographics (age, gender identity, race/ethnicity); risk exposure group (injection drug use (IDU), men who have sex with men (MSM), heterosexual transmission/other); SES (education, income); insurance status (public vs. private); and length of time since HIV diagnosis.

Analysis

Descriptive analyses were run to examine multiple indicators of housing status and housing service need as well as to track year by year trends over time in housing needs and receipt of housing services. To examine the relationship between housing need, housing assistance, and HIV medical care outcomes, a series of multiple random effects logistic regression models were used to estimate the predictors of outcomes, adjusting for correlation among repeated observations on individuals. Since both housing situation and medical service use can vary over time, each interview with each CHAIN study participant constituted an opportunity to examine the relationship between housing need and receipt of housing assistance for medical care outcomes, controlling for other service needs, receipt of supportive services to address co-occurring needs, demographic and other covariates.

We examine the contemporaneous and prospective relationships between housing and outcomes. The first models test the relationship between housing need, housing services and covariates at each interview period as these factors increase or decrease the likelihood that the individual is currently in the positive engagement in care status: consistent care, care that meets minimum clinical practice standards, adherent ARV use, viral suppression. Pooled data across interviews are used for these analyses. The "entry" models estimate the predictors of the entry into attaining the positive outcome among those who did not attain the outcome in the previous interview period. Thus, the entry measure models include respondents who completed at least 2 interviews and who had at least one period when they did not attain the outcome (e.g., not continuous care, unsuppressed viral load) in the previous round of interview. The "sustained" models estimate the predictors of continuous attainment of the outcomes across multiple waves of interviewing. These models include respondents who completed at least 2 interviews and who had attained the outcome at least once in the previous round of interviewing. Note that food insecurity questions were not asked until 2004, thus the regression models include data from 2004 to 2017.

Results

Sample descriptives

Table 2 presents background characteristics of the study sample at baseline interview. Sixty percent of the sample are male. Over half of the sample are Black, and one-third Latinx/Hispanic. The majority are between 35-49 years old (mean age 45) with relatively few less than 35 years old. Income levels are low with half of participants receiving $7500 or less in income per year from all sources; 41% have not completed high school. Over three-fourths (77%) have a history of problem alcohol or drug use with 23% reporting recent (past six months) use. Over one-third score very low on a standardized measure of mental health functioning.

Housing needs and housing services over time

Table 3 examines different indicators of housing need at baseline assessment. For each cohort, the majority of CHAIN study participants were stably housed at baseline interview; however, over one-fourth (27%) were homeless or unstably housed (Table 3). The proportion of literal homelessness at baseline interview was somewhat higher among the cohort recruited in 2002-04 compared to PLWH recruited in 2009-11 (18% and 11% respectively), but rates overall are much higher than among the broader low-income population in NYC, with an estimated rate of homelessness of 6% among residents with incomes below the poverty level (CPRC, NYC Poverty Tracker). About one-third of all participants self-report housing problems or need for housing assistance – a rate that has remained fairly constant since the inception of the CHAIN study in 1994 (Aidala et al. 2006). Problems described in response to open-ended questions include not having a regular place to live; not being able to pay rent; being asked to leave a 'doubled up' situation; being discharged from a housing program, living in a treatment facility, or other institution; habitability (e.g. no heat, damaged wiring) or access (need elevator building) issues; need to leave domestic violence or unsafe situation; facing eviction or other housing loss with no resources to secure housing.

Both objective and subjective sources of data were used to classify type of need for housing assistance including classification of housing status based on description of living situation at cohort enrollment, participant report of housing problems, and additional information about their tenancy rights, economic resources and behavioral health challenges. Participants were classified as seriously rent burdened, needing permanent housing, or needing permanent supportive housing regardless of whether they defined any housing need in these terms. This information provides a portrait of different types of housing-related service need that may inform service planning. Subsequent analyses do not distinguish among types of housing need.

The rate of need for housing assistance has remained at 80% or higher of all CHAIN cohort members for almost every year since 2002, if we consider both those with housing need who received no housing assistance at all during the past six months (lighter color) and those who received some type of housing assistance or services during this time period (darker color) (Figure 1). Cross-sectional trend data indicate there has been a reduction in housing service 'gaps' – the percentage of study participants who were homeless/ unstably housed, unable to pay rent or experiencing other housing problems but did not receive any type of housing assistance or services to address these needs.

Table 2. Sample Characteristics at Baseline Interview[1]

	2002-2004 (693)	2009-2011 (319)	Total (1012)
(n=)			
Gender			
Female	39%	38%	39%
Male	59%	61%	60%
Transgender	2%	<1%	2%
Race/Ethnicity			
White, Non-Hispanic	9%	8%	9%
Black, Non-Hispanic	55%	54%	55%
Latinx /Hispanic	34%	35%	35%
Other[2]	1%	3%	2%
Age Group			
<35 years old	9%	8%	9%
35-49 years old	59%	51%	57%
50 + years old	31%	40%	34%
Mean (SD)	45 (8.3)	47.9 (9.8)	46 (8.9)
Education			
Less than High School	40%	42%	41%
High School/GED	43%	44%	43%
Post-secondary	17%	14%	16%
Risk Exposure			
MSM	23%	27%	24%
IDU	32%	17%	27%
MSM+IDU	4%	4%	4%
Heterosexual/ Other	41%	52%	44%
HIV Diagnosis Year			
<1996	66%	42%	59%
1996-2001	31%	29%	30%
2002 or later	3%	28%	11%
Annual Income			
< $7500	49%	33%	44%
$7500 +	51%	67%	56%
Health Insurance			
No insurance	<1%	<1%	<1%
Public Insurance	97%	96%	96%
Private Insurance	3%	4%	3%
Problem Substance Use[3]			
Current (within past 6 months)	30%	18%	26%
Past (> 6 months ago)	51%	51%	51%
Never	19%	31%	23%
Mental Health Functioning[4]			
Very low (MCS<37)	36%	28%	33%
Higher mental health score (MCS 37+)	64%	72%	67%
Mean (SD)	42.7 (12.4)	42.4 (8.9)	42.6 (11.4)

[1.] New York City CHAIN study participants enrolled 2002-2004, or 2009-2011

[2] Includes Asian, Pacific Islander, Native American, Alaskan, Hawaiian, Other and Mixed.

[3] Use of heroin, cocaine, crack or methamphetamine, or problem drinking (CAGE). Ewing JA. Detecting Alcoholism: The CAGE questionnaire. JAMA. 1984; 252: 1905-1907.

[4] MOS-SF36 Mental Component Summary Score <37.0, mean score among psychiatric inpatient populations.

Table 3. Housing Status and Housing Problems and Housing Needs at Baseline Interview[1]

	2002-2004	2009-2011	Total
(n=)	(693)	(319)	(1012)
Housing Status at Current Interview			
• Stable, in own place	73%	72%	72%
• Temporarily doubled up with others	6%	3%	5%
• Temporary/ transitional housing program[2]	3%	13%	6%
• Homeless: in shelter, SRO, street, place not meant for sleeping[3]	18%	11%	16%
Housing Transience			
• Moved at least once in past 6 months	24%	17%	22%
Self-reported Housing Problems[4]			
Regardless of housing status participant reported: Without a permanent place to live, unable to pay rent, unable to pay utilities, facing eviction, being discharged from program with no resources to secure housing, lacking heat or working plumbing, experiencing domestic violence or other dangerous situation, in need of an accessible unit	35%	30%	33%
Type of Need for Housing Assistance[5]			
• No housing need	9%	6%	8%
• Seriously rent burdened [6]	59%	66%	61%
• Need permanent housing[7]	17%	13%	16%
• Need permanent supportive housing[8]	15%	15%	15%
History of Homelessness/Unstable Housing[8]			
Housing experience during the year prior to HIV diagnosis: Sleeping on the streets; in a homeless shelter; SRO or welfare hotel; residential drug treatment, jail, or other temporary housing; or doubled up with others, in somebody else's home.	46%	34%	42%

1. New York City CHAIN study participants enrolled 2002-2004, or 2009-2011
2. Transitional housing program, corrections halfway house, mental health, drug treatment, other residential treatment setting
3. Street, shelter, limited-stay SRO or welfare hotel, car, abandoned building, or other place not intended for sleeping
4. Answers to questions: "Please tell me if, in the last 6 months, that is since _____ (*reference date*), you had a problem or needed assistance in in the area of housing? (if YES) Please tell me a little bit more about your need for assistance with housing or the problem you had (*Interviewer probe for clarity and completeness*)
5. Classification based on both objective and subjective sources of data including classification of housing status based on description of living situation at cohort enrollment, participant report of housing problems, and additional information about their tenancy rights, economic resources and behavioral health challenges
6. Seriously rent burdened: Currently in own housing but seriously rent burdened indicated by reported difficulty paying rent fairly often or very often in the past 6 months; current income insufficient to secure housing (FMR>50% of income)
7. Need Permanent Housing : Currently homeless, temporarily doubling up, or living in temporary or transitional housing for any time during the last 6 months; or currently in own housing but facing eviction (for any reason) or needing to move; and not needing supportive housing (defined below).
8. Need Permanent Supportive Housing: Currently homeless, temporarily doubling up, or living in a temporary/ transitional housing program for any time during the last 6 months; or currently in own housing but facing eviction or housing loss due to non-payment or other reason, AND experiencing persistent mental illness or substance use disorder, or chronically homeless, as indicated by long duration or multiple episodes of homelessness
9. Among study participants diagnosed 1996 or later.

Figure 1. Rate of Need for Housing Assistance by Date of Interview: 2002 - 2014

Rate of Need for Housing Assistance by Date of Interview

Legend: ■ Unmet Need for Housing Assistance ■ Need & Receiving Housing Assistance
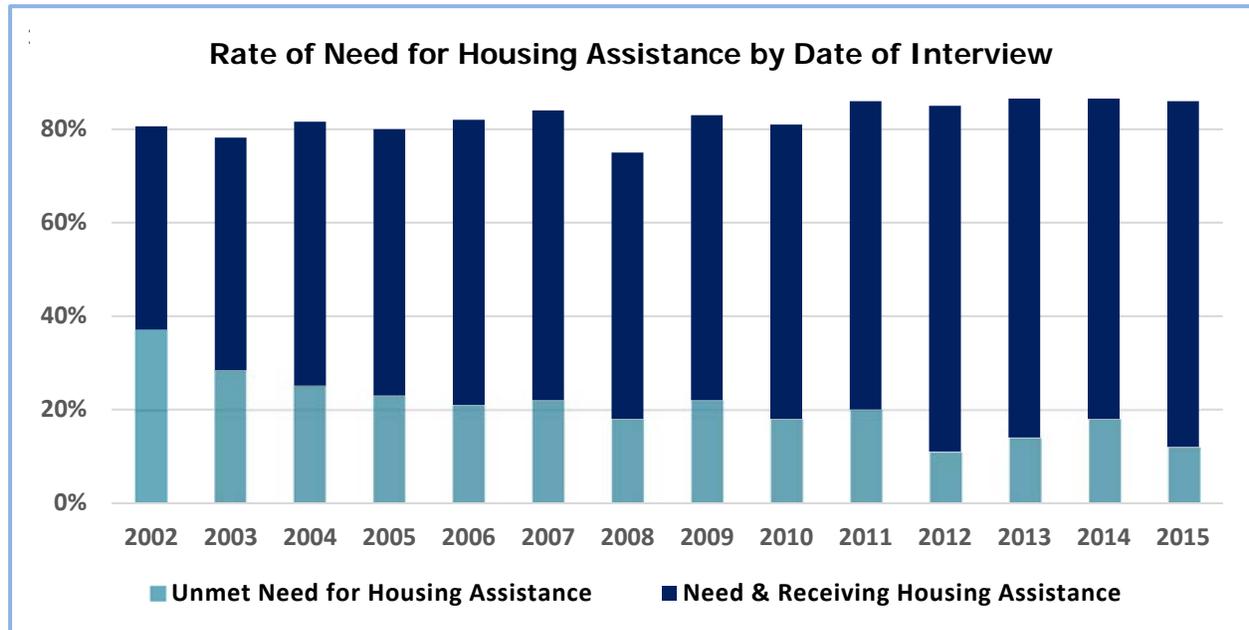
Note: Shown is the total percentage of CHAIN study participants needing housing assistance broken down between those with housing need who received no housing assistance during the past six month (lighter color) and those who received some type of housing assistance or services during this time period (darker color).

Resolution of housing needs

The trend data show that, in the aggregate, the percentage of cohort members who experience housing needs has remained fairly constant regardless of the time period when the question is asked. However, when we focus on PLWH with the most serious need, who are homeless or unstably housed with an urgent need to secure adequate stable housing, and trace forward housing histories of the same individuals, we find that over time, almost all succeed in obtaining stable housing (data not shown). However, the length of time to securing housing among formerly homeless/ unstably housed CHAIN participants is on average over 24 months (mean 28.4 months; std dev 18.9).

In addition, once individuals obtain stable housing, different housing problems may emerge among those who now have a place to live. This may be the case as well for individuals who receive rental assistance that reduces extreme rent burden or threat of eviction. An individual's economic or health situation, and/or household composition may change such that clients whose housing problems were resolved at an earlier time, now have developed need for housing services. In general, it appears that housing difficulties are not easily nor quickly resolved but most clients who persist in putting forth their problems and seeking services secure stable housing if not resolution of all housing-related needs.

Housing and engagement in HIV care

Tables 4, 5, 6, 7 present the results of the analyses of housing need and receipt of housing assistance as predictors of continuity of care, receiving appropriate HIV care, adherent ARV use, and viral suppression.

Continuous HIV Medical Care

Table 4 presents a series of analyses that examine continuity of care – indicated by the absence of missed scheduled appointments for HIV medical care, or any intentional gap in appointments for 6 months or more. Model 1 tests the relationship between housing need and receipt of housing assistance at each interview period as these factors increase or decrease the likelihood that the individual has maintained continuous HIV care. Model 2 examines entry into continuous care among participants who were not in continuous care the previous interview period. Model 3 examines sustained continuity of care at successive interviews. All models also consider low mental health functioning, current problem substance use, food and transportation needs, services to address these needs, as well as medical and social services case management.

Housing need is a barrier to experiencing continuous HIV medical care, and entering and staying in continuous care over time. The odds of continuous care, entry into continuous care after a period of inconsistent care, and sustained continuous care over multiple interview periods are about half as high among study participants who need housing assistance compared to those without housing needs. Problem substance use, low mental health functioning, food insecurity and transportation needs are also strongly negatively associated with continuous care. However, need for housing assistance significantly reduces odds of continuous care (AOR 0.730, CI 0.59, 0.89) as well as sustained continuous care (AOR 0.717, CI 0.53, 0.97) in the full adjusted models, controlling for other service needs, service utilization, and client characteristics.

Receipt of housing assistance in the past six months is not associated with continuous care indicators.

Care that Meets Practice Guidelines

The same analytical approach was used to examine housing need and receipt of housing assistance as predictors of receiving appropriate HIV medical care that meets minimum clinical practice guidelines (Table 5). A participant is considered to be "engaged in appropriate medical care" at each interview in which all indicators – recommended visits, tests, treatments and procedures are consistent with standards for appropriate medical care for HIV. We examine predictors of entry into appropriate care among participants who were not in care or receiving less than appropriate medical care at the previous interview period. To examine sustained engagement in appropriate care, a person is considered retained in care if he or she continues to receive appropriate HIV care at successive interviews. Like the models assessing continuity of care, all engagement models control for other service needs, services received, demographic, and other client characteristics.

PLWH who are homeless/unstably housed or have other housing needs are less likely to be engaged in medical care that meets minimum clinical practice standards (AOR 0.798, CI 0.66, 0.96) or enter into or sustain appropriate care. The odds of receiving medical care that meets clinical practice guidelines, and entry into appropriate care, are substantially higher for persons with housing needs who receive housing assistance compared to persons not receiving such assistance, although effects are reduced in the full adjusted models.

Adherent ARV Use

There is an increased risk of non-adherence among PLWH who need housing assistance (Table 6). Homelessness/unstable housing or having other housing needs is negatively associated with adherent ARV use (AOR 0.583, CI 0.47, 0.72), sustained adherent ARV use (AOR 0.620, CI 0.48, 0.80), and entry into adherent ARV use after of a period of non-adherence (AOR 0.622, CI 0.46, 0.84), controlling for behavioral health and other supportive service needs, and a wide range of client characteristics. On the other hand, the odds of adherent ARV use, as well as sustained adherent ARV use are substantially higher for persons who receive rental assistance or other help with resolving housing needs (AOR 1.438, CI 1.07, 1.93; AOR 1.538, CI 1.08, 2.20, respectively). Current problem substance use, food insecurity, and transportation needs, are also barriers to adherent ART use. Receipt of medical case management and case management focused on addressing social service needs increases the odds of entry into adherent ARV among those who were non-adherent at prior interview assessment period (Table 6).

Viral Suppression

Housing need significantly reduces the odds of viral suppression in cross sectional analyses and with achieving and sustaining viral suppression in overtime models (AOR 0.624, CI 0.45, 0.87). See Table 7. Receipt of housing assistance is associated with higher odds of suppressed viral load (AOR 1.510, CI 1.09, 2.09). Homelessness/unstable housing or having other housing needs is an independent predictor of viral load outcomes, controlling for active substance use, low mental health functioning, challenges addressing food and transportation needs and other services to address needs. No other services are independently associated with positive viral load outcomes. Receipt of medical case management, social service case management, and/or drug treatment in the past six months is negatively associated with viral load outcomes. However, this likely results from the fact that complex needs and poor viral suppression is a trigger for enrollment in medical case management or a care coordination program that often includes linkages with behavioral health services.

Summary and Discussion

Despite increasing awareness of adequate housing as a pivotal service in the continuum of care model for HIV services, and the need for health care and other policy changes increasing resources to address housing needs among persons with HIV, the vast majority of PLWH in NYC experience needs for housing assistance at one or more points in time over the course of their illness. A continuing issue is the disparity between income and housing costs. The median monthly income for participants in the CHAIN study, whether supported by paid employment or public benefits, at $729 per month is below the fair market rent for a studio apartment in NYC of approximately $1500/month. Considering the income-to-rent disparities, it is not surprising that 80% of NYC participants need rental assistance or other support for housing costs to secure or maintain stable housing.

A greater proportion of PLWH with housing needs than in previous study periods are receiving some form of housing assistance (Figure 1 above). However, problems and need for services to address housing issues often continue. One factor is the length of time it takes to actually secure housing – to complete eligibility assessments, get rental assistance in place, and locate a suitable apartment. Increased opportunities for housing assistance among PLWH improves prospects but given the increasingly tight rental market in New York City, the need for safe, secure, affordable housing will most likely continue to outpace supply.

Consistent with prior CHAIN studies, as well as a growing evidence base covering multiple jurisdictions (Aidala, Lee & Siegler 2006; Aidala et al. 2016), there is a strong and consistent relationship between housing need and engagement with HIV medical care along the care continuum Homelessness/unstable housing or having other housing needs is associated with multiple missed appointments or episodes of dropping out of care entirely, as well as lower adherence to ARV. Need for housing assistance is a barrier to entry into appropriate care, continuous care, and adherent ARV use after a period of no or lack of appropriate care, as well as a barrier to maintaining consistent engagement with care and medication adherence over time. Housing need is negatively associated with viral suppression in cross-sectional analyses and with achieving and maintaining suppression in over-time models.

On the other hand, receipt of housing assistance is associated with engagement in appropriate care defined here as care that meets minimum practice standards based on recommended number of visits, monitoring tests and procedures. Housing assistance is associated with adherent ARV use and sustained adherent ARV use, controlling for a range of client demographic and behavioral health characteristics as well as other service needs, and services received. Receipt of housing assistance is positively associated with viral suppression but not statistically significant in adjusted models.

While analyses show that housing assistance makes a difference along the HIV care continuum, study findings indicate that housing assistance is less consistently predictive of improved medical care and clinical outcomes, once substance use, mental health, and supportive service needs for food and transportation assistance are included in the models.

One consideration is the widespread financial insecurity among PLWH, regardless of receipt of rental or other forms of housing assistance. Monthly costs to cover basic needs for a single adult living in the NYC metro area are estimated at $162 for utilities, $314 for food, $738 for other necessities such as clothing, personal hygiene products, phone service, totaling over $1000 without considering additional costs such as transportation or out of pocket medical expenses (Economic Policy Institute, 2018). Income after 30% rent contribution is far below this amount for the great majority of PLWH in New York.

Housing assistance is necessary for increasing numbers of PLWH, but in itself is often insufficient to remove barriers to sustained engagement in HIV care and positive health outcomes. Access to affordable housing is ever more challenging, not only an issue of finding appropriate housing but maintaining housing and addressing multiple, concurrent needs and challenges. Particularly

important are initiatives to address food and nutrition needs as, on average, 40% of study participants who are receiving housing assistance, are food insecure. Food insecurity and poor nutrition are themselves major impediments to engagement in HIV care, adherent ARV use, and sustained viral suppression (Aidala, et al. 2019). One in five PLWH receiving housing assistance need services or treatment for substance use and/ or mental health needs; 12% report transportation barriers.

Results of cross-sectional and overtime analysis support the development of patient-centered, care-coordination models that integrate services to address multiple medical, behavioral health, and social needs among PLWH. In addition to providing patient-centered integrated care, programs should explore the possibility of using alternative forms of care delivery for homeless/unstably housed/clients such as including community health workers or delivering care using mobile medical care teams in an effort to improve engagement in care and HIV-related outcomes.

Table 4. Housing Need, Housing Assistance, and Continuous Care

	Continuous Care		Entry into Continuous Care		Sustained Continuous Care	
	OR	AOR	OR	AOR	OR	AOR
Housing Need						
Need Housing Assistance[1]	0.509***	0.730**	0.501***	0.864	0.506***	0.717*
Housing Assistance						
Received Housing Assistance or Services[2]	0.915	0.976	1.181	1.192	0.832	0.926
Other Service Needs						
Past Problem Substance Use	0.563***	0.528***	1.067	0.803	0.632*	0.503**
Current Problem Substance Use	0.220***	0.260***	0.497*	0.417*	0.198***	0.215***
Low Mental Health Functioning	0.602***	0.691***	0.689*	0.887	0.461***	0.529***
Food Insecurity	0.415***	0.532***	0.387***	0.429***	0.432***	0.535***
Transportation Needs	0.460***	0.651**	0.226***	0.250***	0.683	1.211
Other Services Received						
Medical Case Management[3]	1.076	1.214	1.218	1.316	0.814	1.027
Social Service Case Management[4]	0.975	1.048	1.068	1.020	0.744*	0.884
AOD Treatment or Services	0.641**	0.882	0.841	1.054	0.701	1.027
MH Treatment or Services	0.810	0.936	0.865	0.909	0.737*	0.977
Food and Nutrition Services	0.942	1.142	0.969	1.172	0.812	1.070
Transportation Services	0.882	1.028	0.781	1.070	0.830	0.856

Note: OR =odds-ratio; AOR =adjusted odds ratio * $p < .05$; ** $p < .01$; *** $p < .001$

Logistic regression equations using random effects procedure to adjust for the dependency among multiple observations contributed by the same individual. The first model examines predictors of continuous care (n= 845 respondents, 3,555 observation points). Model 2 examines predictors of entry into continuous care among respondents who were not in continuous care the previous interview period (n=377 respondents not in continuous care at one or more interview periods, 688 observation points). Model 3 examines sustained continuity of care at successive interviews (n=694 respondents with over time data; 2,083 observation points). All models control for age, gender, race/ethnicity, education, income, risk exposure group, insurance status, and year of HIV diagnosis.

[1] Homeless/unstably housed past 6 months, or severely rent burdened, or need housing assistance to obtain housing, address safety or habitability issues, or avoid housing loss. [2] Received rental assistance or 'practical' help or assistance with housing problems in the past 6 months that resolved needs or achieved "some" or "a great deal" of progress resolving housing needs. [3] Received assistance from a case manager in the past six months with access or referrals to specific medical services or with providing help or referring for help with taking ARV medication. [4] One or more of the following services from a case manager in the last six months: developed or revised care plan for dealing with needs, helped with accessing or referrals to specific social services or help with filling out forms for benefits or entitlements

Table 5. Housing Need, Housing Assistance, and Appropriate HIV Medical Care that Meets Minimum Clinical Standards

	Appropriate Medical Care		Entry into Appropriate Care		Sustained Appropriate Care	
	OR	AOR	OR	AOR	OR	AOR
Housing Need						
Need for Housing Assistance[1]	0.643***	0.798*	0.705*	0.793	0.829	0.858
Housing Assistance						
Received Housing Assistance or Services[2]	2.095***	1.150	1.420*	1.193	1.256	1.104
Other Service Needs						
Past substance Use	1.165	1.043	1.375	1.135	1.319*	1.057
Current Substance Use	0.881	0.870	1.226	1.030	1.076	0.844
Low mental health functioning	0.658***	0.758**	0.729*	0.765	0.749***	0.785*
Food Insecurity	0.846*	0.886	0.827	0.928	0.852	0.834
Transportation Needs	0.814*	0.805	0.551**	0.575*	0.968	0.961
Other Services Received						
Medical Case Management[3]	0.674***	1.176	1.588**	1.446*	1.172	1.152
Social Service Case Management[4]	1.045	1.064	1.207	1.119	1.083	1.034
AOD Treatment or Services	1.358***	1.030	1.189	1.081	1.072	1.032
MH Treatment or Services	0.974	1.249*	1.319*	1.252	1.197	1.254*
Food and Nutrition Services	1.176	1.161	1.236	1.133	1.155	1.128
Transportation Services	1.400***	1.363*	0.834	1.064	1.372*	1.495*

Note: OR =odds-ratio; AOR =adjusted odds ratio   * p < .05;   ** p < .01;   *** p < .001

Logistic regression equations using random effects procedure to adjust for the dependency among multiple observations contributed by the same individual. The first model examines predictors of receipt of appropriate medical care (n= 846 respondents, 3,560 observation points). Model 2 examines predictors of entry into appropriate care among respondents who were not receiving appropriate care the previous interview period (n=691 respondents not receiving appropriate care at one or more interview periods, 1,266 observation points). Model 3 examines sustained appropriate care at successive interviews (n=693 respondents with over time data; 2,013 observation points). All models control for age, gender, race/ethnicity, education, income, risk exposure group, insurance status, and year of HIV diagnosis.

[1] Homeless/unstably housed past 6 months, or severely rent burdened, or need housing assistance to obtain permanent housing, address safety or habitability issues, or avoid housing loss.

[2] Received housing assistance or 'practical' help or assistance with housing problems in the past 6 months that resolved needs or achieved "some" or "a great deal" of progress resolving housing needs.

[3] Received assistance from a case manager in the past six months with access or referrals to specific medical services or with providing help or referring for help with taking ARV medication.

[4] One or more of the following services from a case manager in the last six months: developed or revised care plan for dealing with needs, helped with accessing or referrals to specific social services or help with filling out forms for benefits or entitlements

Table 6. Housing Need, Housing Assistance, and Adherent ARV Use

	Adherent ARV Use		Entry into Adherent ARV Use		Sustained Adherent ARV Use	
	OR	AOR	OR	AOR	OR	AOR
Housing Need						
Need Housing Assistance[1]	0.468***	0.583***	0.541***	0.622**	0.471***	0.620***
Housing Assistance						
Received Housing Assistance or Services[2]	1.505***	1.438*	1.389	1.333	1.470*	1.538*
Other Service Needs						
Past substance Use	0.789	0.766	1.159	1.175	0.792	0.626*
Current Substance Use	0.295***	0.326***	0.482**	0.531*	0.350***	0.313***
Low mental health functioning	0.633***	0.878	0.812	1.050	0.642***	0.846
Food Insecurity	0.443***	0.639***	0.477***	0.614***	0.483***	0.714*
Transportation Needs	0.447***	0.546***	0.539***	0.562**	0.413***	0.621*
Other Services Received						
Medical Case Management[3]	0.969	1.046	1.377*	1.341	0.813	0.974
Social Service Case Management[4]	1.152	1.247	1.501**	1.485*	0.979	1.179
AOD Treatment or Services	0.660**	0.812	0.677*	0.850	0.711	0.907
MH Treatment or Services	1.064	1.181	1.320	1.509*	0.871	1.019
Food and Nutrition Services	0.811*	0.909	0.885	0.826	0.808	0.943
Transportation Services	0.736*	0.896	1.028	1.126	0.614**	0.769

Note: OR =odds-ratio; AOR =adjusted odds ratio * $p < .05$; ** $p < .01$; *** $p < .001$

Logistic regression equations using random effects procedure to adjust for the dependency among multiple observations contributed by the same individual. The first model examines predictors of adherent ARV use (n= 846 respondents, 3,560 observation points). Model 2 examines predictors of entry into adherent ARV use among respondents who were not in adherent ARV users in the previous interview period (n=516 respondents not adherent ARV users at one or more interview periods, 2,078 observation points). Model 3 examines sustained adherent ARV use at successive interviews (n=709 respondents with over time data; 2,083 observation points). All models control for age, gender, race/ethnicity, education, income, risk exposure group, insurance status, and year of HIV diagnosis.

[1] Homeless/unstably housed past 6 months, or severely rent burdened, or need housing assistance to obtain housing, address safety or habitability issues, or avoid housing loss.

[2] Received rental assistance or 'practical' help or assistance with housing problems in the past 6 months that resolved needs or achieved "some" or "a great deal" of progress resolving housing needs.

[3] Received assistance from a case manager in the past six months with access or referrals to specific medical services or with providing help or referring for help with taking ARV medication.

[4] One or more of the following services from a case manager in the last six months: developed or revised care plan for dealing with needs, helped with accessing or referrals to specific social services or help with filling out forms for benefits or entitlements

Table 7. Housing Need, Housing Assistance, and Viral Suppression

	Suppressed Viral Load		Entry into Viral Suppression		Sustained Viral Suppression	
	OR	AOR	OR	AOR	OR	AOR
Housing Need						
Need Housing Assistance[1]	0.505***	0.643***	0.592***	0.706	0.508***	0.624**
Housing Assistance						
Help Received Housing Assistance or Services[2]	1.512***	1.510*	0.826	1.034	1.205	1.445
Other Service Needs						
Past Problem Substance Use	0.519***	0.511**	0.657	0.622	0.665	0.7675
Current Problem Substance Use	0.221***	0.220***	0.367***	0.308***	0.225***	0.271***
Low Mental Health Functioning	0.691***	0.825	0.822	1.030	0.669*	0.796
Food Insecurity	0.640***	0.869	0.740*	0.735	0.694*	1.114
Transportation Needs	0.539***	0.832	0.610*	0.800	0.779	1.089
Supportive Services						
Medical Case Management[3]	0.670***	0.820	0.969	0.936	0.586***	0.752
Social Service Case Management[4]	0.755**	0.874	0.951	0.906	0.586***	0.743
AOD Treatment or Services	0.444***	0.564***	0.613*	0.916	0.272***	0.492**
MH Treatment or Services	1.012	1.122	1.212	1.312	0.908	1.077
Food and Nutrition Services	0.799	0.882	0.889	0.826	0.719*	0.868
Transportation Services	0.961	0.959	0.925	1.004	1.124	1.084

Note: OR =odds-ratio; AOR =adjusted odds ratio   * p < .05;   ** p < .01;   *** p < .001

Logistic regression equations using random effects procedure to adjust for the dependency among multiple observations contributed by the same individual. The first model examines predictors of viral suppression (n= 829 respondents, 3,331 observation points). Model 2 examines predictors of entry into viral suppression among respondents who were not virally suppressed the previous interview period (n=391 respondents not virally suppressed at one or more interview periods, 750 observation points). Model 3 examines sustained viral suppression at successive interviews (n=699 respondents with over time data; 2,144 observation points). All models control for age, gender, race/ethnicity, education, income, risk exposure group, insurance status, and year of HIV diagnosis.

[1] Homeless/unstably housed past 6 months, or severely rent burdened, or need housing assistance to obtain housing, address safety or habitability issues, or avoid housing loss.

[2] Received rental assistance or 'practical' help or assistance with housing problems in the past 6 months that resolved needs or achieved "some" or "a great deal" of progress resolving housing needs.

[3] Received assistance from a case manager in the past six months with access or referrals to specific medical services or with providing help or referring for help with taking ARV medication.

[4] One or more of the following services from a case manager in the last six months: developed or revised care plan for dealing with needs, helped with accessing or referrals to specific social services or help with filling out forms for benefits or entitlements

References

Aidala A, Lee G, Siegler A. (2006). Housing Need, Housing Assistance and Connection to HIV Medical Care. Community Health Advisory & Information Network Report 2006-5. New York Health & Human Services Planning Council. http://www.nyhiv.org/pdfs/chain/Housing_Medical%20Care%202007_05-02-07.pdf

Aidala AA, Lee G, Abramson DA, Messeri P, Siegler A. (2007). Housing need, housing assistance, and connection to HIV medical care. *AIDS & Behavior*, 11(S2): S101-S115.

Aidala AA and Sumartojo E. (2007). Why housing? *AIDS & Behavior*, 11 (S2): S1-S6.

Aidala AA, Wilson MG, Shubert V, Gogolishvili D, Globerman J, Rueda S, Bozack AK, Caban M, Rourke SB. (2016). Housing Status, Medical Care, and Health Outcomes Among People Living With HIV/AIDS: A Systematic Review. *Amer J Public Health*. 106(1):e1-23.

Aidala AA, Yomogida M, Leigh J. (2019). Food Security and HIV Prevention and Care. R DiClemente and R Crosby (Eds). *Preventing HIV Transmission and Improving HIV Care Through the Use of Structural-Level Approaches: Global Insights from Successful Approaches.* Oxford University Press.

Bamberger J, Bluestein R, Latimer-Nelligan K, Samson R, Shoemaker D. (2017). Innovative *Models In Health And Housing*. Kresge Foundation/ California Endowment. Available at http://www.liifund.org/wp-content/uploads/2017/07/LIIF_whitepaper_pages.pdf

Centers for Disease Control and Prevention (CDC) (2018). . Social determinants of health among adults with diagnosed HIV infection, 2016. HIV Surveillance Supplemental Report 23(No. 6, pt A & B). https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-report-2016-vol-23-6.pdf

Center on Poverty and Social Policy, Columbia University (CPSP). n.d. Poverty Tracker: Monitoring Poverty and Well-Being in NYC. https://www.povertycenter.columbia.edu/poverty-disadvantage-in-new-york-city#robin-hood-poverty-tracker

Clemenzi-Allen A, Geng E, Christopoulos K, Hammer H, Buchbinder S, Havlir D, & Gandhi M. (2018). Degree of Housing Instability Shows Independent "Dose-Response" With Virologic Suppression Rates Among People Living With Human Immunodeficiency Virus. *Open Forum Infectious Diseases*, 5(3): 1-3.

Doran KM, Misa EJ, Shah NR. (2013). Housing as Health Care - New York's Boundary-Crossing Experiment. New Eng J Medicine, 369:2374-2377.

Economic Policy Institute (2018). EPI's Family Budget Calculator, 2017 dollars. https://www.epi.org/resources/budget/

Feller DJ, Agins BD (2017). Understanding Determinants of Racial and Ethnic Disparities in Viral Load Suppression: A Data Mining Approach. *J Int Assoc Provid AIDS Care*. 16(1):23-29.

HIV/AIDS Bureau (HAB). U.S. Department of Health and Human Services HIV/AIDS Program. HAB HIV Performance Measures. Available at https://hab.hrsa.gov/clinical-quality-management/performance-measure-portfolio

HIV.gov (2018). The Affordable Care Act and HIV/AIDS. https://www.hiv.gov/federal-response/policies-issues/the-affordable-care-act-and-hiv-aids

Lowe, Eugene T. (2016). *The U.S. Conference of Mayors' Report on Hunger and Homelessness: A Status Report on Homelessness and Hunger in America's Cities*, Washington, DC: U.S. Conference of Mayors. Available at https://endhomelessness.atavist.com/mayorsreport2016

Mugavero MJ et al. for the Retention in Care (RIC) Study Group (2012)   Measuring retention in HIV Care: The elusive gold standard. *J Acquir Immune Defic Syndrome*, 61 (5): 574-580

Milloy MJ, Marshall BD, Montaner J, Wood E. (2012). Housing Status and the Health of People Living with HIV/AIDS. *Curr HIV/AIDS Rep*. 9(4): 364–374.

National Institutes of Health (NIH) AIDSinfo. Panel on Antiretroviral Guidelines for Adults and Adolescents. Table 4 from Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents Living with HIV. Department of Health and Human Services. Available at http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf

New York City (NYC.gov) (2017). Medical Monitoring Project (MMP): Results from survey of people receiving HIV care in 2013-2014 in NYC. HIV Epidemiology & Field Services Program. New York City Department of Health and Mental Hygiene. https://www1.nyc.gov/assets/doh/downloads/pdf/dires/mmp-report-2013-2014.pdf

New York State (NYS.gov). Disability Programs. https://www.ny.gov/services/apply-federal-disability-benefits

New York State Department of Health (NYS DOH). (2018). NYS Medicaid Redesign Team Supportive Housing Initiative. https://www.health.ny.gov/health_care/medicaid/redesign/supportive_housing_initiatives.htm

New York State Department of Health (NYS DOH). (2019). Medicaid Health Homes - Comprehensive Care Management. https://www.health.ny.gov/health_care/medicaid/program/medicaid_health_homes/

New York State Governor's Office (2016). Governor Cuomo Announces All HIV-Positive Individuals in New York City to Become Eligible For Housing, Transportation and Nutritional Support. https://www.governor.ny.gov/news/governor-cuomo-announces-all-hiv-positive-individuals-new-york-city-become-eligible-housing

Norberg A, Nelson J, Holly C, Jewell ST, Lieggi M, Salmond S. (2019). Experiences of HIV-infected adults and healthcare providers with healthcare delivery practices that influence engagement in US primary healthcare settings: a qualitative systematic review. *JBI Database System Rev Implement Reports*. 17(6):1154-1228

Parashar S. (2016). The Place of Housing Stability in HIV Research: A Critical Review of the Literature *Housing, Theory and Society,* 33 (3): 342-356.

Phillips HJ, Tinsley MJ, Rajabiun S. (2018). Building a Medical Home for HIV-Positive, Multiply Diagnosed Homeless Populations. *Amer J. Public Health* 108 (57): S518-S518.

Terzian AS, Irvine MK, Hollod LM, Lim S, Rojas J, Shepard CW. (2015). Effect of HIV Housing Services on Engagement in Care and Treatment, New York City, 2011. *AIDS & Behavior*. 19(11): 2087–2096.

U.S. Dept. of Housing and Urban Development (HUD). (2018). FY 2018 Fair Market Rent Documentation System. https://www.huduser.gov/portal/datasets/fmr/fmrs/FY2018_code/2018summary.odn