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## Mental Health, Substance Use and HIV Risk Behaviors among HIV-Positive Adults Who Experienced Homelessness in the United States —Medical Monitoring Project, 2009–2015

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### Abstract

Homelessness is a challenge to retention in HIV care and adherence to antiretroviral therapy. We describe the sociodemographic and behavioral characteristics of HIV-positive adults who reported recent homelessness. The Medical Monitoring Project is a complex sample survey of HIV-positive adults receiving medical care in the United States. We used weighted interview and medical record data collected from June 2009 to May 2015 to estimate the prevalence of depression, substance use, and HIV risk behaviors among adults experiencing recent homelessness. From 2009 to 2015, 8.3% of HIV-positive adults experienced recent homelessness. Homeless adults were more likely than housed adults to have major depression, to binge drink, use non-injection drugs, use injection drugs, and smoke. Over 60% of homeless adults were sexually active during the past year, with homeless adults reporting more condomless sex with an HIV-negative or unknown status sex partner than housed adults. Programs attempting to improve the health outcomes of HIV-positive homeless persons and reduce ongoing HIV transmission can focus on providing basic needs, such as housing, and ancillary services, such as mental health counseling or substance abuse treatment and counseling.

### Keywords

Homeless; HIV; HIV risk behaviors; substance use; depression

### Introduction

In 2012, 8.3% of HIV-positive adults in HIV care were homeless (White House Office of National AIDS Policy [ONAP], 2015). Homelessness is a barrier to HIV care engagement, adherence to antiretroviral therapy (ART) and viral suppression, which is key to individual health and the prevention of onward HIV transmission (Aidala, Lee, Abramson, Messeri, & Siegler, 2007; Aidala et al., 2016; Clemenzi-Allen et al., 2018; Chen et al., 2013; Harris,

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Xue, & Selwyn, 2016; Kidder, Wolitski, Campsmith, & Nakamura, 2007; Milloy, Marshall, Montaner, & Wood, 2012; Thakrar, Morgan, Gaeta, Hohl, & Drainoni, 2016). Furthermore, homeless persons report a high burden of mental health problems, substance use, and HIV risk behaviors, such as engaging in condomless sex (Aidala, Cross, Stall, Harre, & Sumartojo, 2005; Chen et al., 2013; Hsu et al., 2015; Kidder et al., 2007; Kidder, Wolitski, Pals, & Campsmith, 2008; Santa Maria, Padhye, Yang, Gallardo, & Businelle, 2018).

Homelessness is a stressor with serious implications for mental health, and homeless persons may use substances to cope with mental illness, suppress hunger, stay warm, or remain awake to reduce the risk of violence or victimization (Christiani, Hudson, Nyamathi, Mutere, & Sweat, 2008; Kelly & Caputo, 2007; Klee & Reid, 1998). Condomless sex more likely occurs when drug use precedes sex or when sex occurs in a non-private setting (Tucker et al., 2012). Additionally, studies have shown that homeless persons have low condom use self-efficacy, which is also associated with condomless sex (Hsu et al., 2015; Tucker et al., 2013). For HIV-positive homeless persons, mental health problems, substance use, and HIV risk behaviors are added challenges to successful HIV care engagement, ART adherence, and viral suppression (Aidala et al., 2005; Chen et al., 2013; Friedman et al., 2009; Riley et al., 2003; Weiser et al., 2006; Wolitski, Kidder, & Fenton, 2007).

In an effort to inform national and local policy makers and HIV prevention programs, and to assess progress towards the national HIV prevention goal of reducing the percentage of homeless persons in HIV care to no more than 5%, we present the only nationally representative estimates of the sociodemographic and behavioral characteristics of HIV-positive adults receiving medical care who reported recent homelessness.

## Materials and Methods

The Medical Monitoring Project (MMP) is an annual cross-sectional survey designed to produce nationally representative estimates of behavioral and clinical characteristics of persons with diagnosed HIV in medical care in the United States. Briefly, MMP used a three-stage, complex sampling design in which U.S. states, Washington, D.C. and Puerto Rico were sampled; followed by facilities providing outpatient HIV clinical care in those jurisdictions; then HIV-positive adults, aged 18 years, receiving care in those facilities. Data were weighted based on known probabilities of selection at each jurisdiction, facility, and patient levels, and then weighted to adjust for non-response. MMP methods, including response rates, have been described in detail elsewhere (Bradley et al., 2010; Frankel et al., 2012; Iachan et al., 2016). Data were combined from matched interviews and medical record abstractions collected from June 2009–May 2015.

## Ethics Statement

In accordance with guidelines for defining public health research, CDC determined MMP was public health surveillance used for disease control, program, or policy purposes (Centers for Disease Control and Prevention). Local institutional review board approval was obtained at participating states, territory, and facilities when required. Informed consent was obtained from all participants.

## Measures

Patients were asked if they lived on the street, in a shelter, in a single room occupancy hotel, or in a car during the past 12 months. If they responded yes to any of these questions, they were categorized as homeless (n=2,386). If they responded no to all questions, they were categorized as housed (n=25,889).

Socio-demographic variables collected included gender, race/ethnicity, age, education attainment, sexual orientation, and health insurance type. Behavioral variables collected and reported by respondents based on the 12 months before being interviewed included drug use, alcohol or drug use before or during sex, condomless sex with an HIV-negative or unknown status partner, and condomless sex while not virally suppressed. Viral load was abstracted from patients' medical records for the year before the interview. Viral suppression was defined as the most recent viral load documented as undetectable or <200 copies/mL. Durable viral suppression was defined as all viral loads during the past 12 months as undetectable or <200 copies/mL.

Binge drinking in the 30 days before being interviewed was defined as having 5 alcoholic drinks for men and 4 alcoholic drinks for women in one sitting on at least one day. Depression during the past two weeks was based on the patient health questionnaire depression scale (PHQ-8) (Kroenke et al., 2009). Poverty guidelines were determined using the U.S. Department of Health and Human Services poverty guidelines corresponding to the calendar year about which the combined household income was asked (U.S. Department of Health and Human Services).

## Statistical Analysis

We calculated unweighted sample sizes and estimated weighted percentages, with associated 95% confidence intervals for homeless and housed adults during the 12 months before their interview for each of the years. We performed bivariate analysis using the Rao-Scott chi-square test to compare the percentage of homeless and housed adults by key socio-demographic and behavioral characteristics (Rao & Scott, 1992). All analyses were performed using SAS 9.3 (SAS Institute, Cary, NC) and accounted for clustering, unequal selection probabilities, and non-response.

## Results

From 2009 to 2015, 8.3% of HIV-positive adults receiving HIV care experienced homelessness during the year before interview. Homeless adults were significantly ( $p<.01$ ) more likely than housed adults to be transgender (3.7% vs. 1.2%), non-Hispanic black (53.2% vs. 40.7%), 29 years (12.1% vs. 7.6%), be incarcerated (19.6% vs. 3.6%), have public insurance only (66.2% vs. 49.4%), and have major (20.2% vs 10.0%) or other depression (15.1% vs. 10.8%) (Table 1).

Over 60% of homeless adults were sexually active during the past year. Homeless adults were significantly ( $p<.01$ ) more likely than housed adults to have condomless sex with an HIV-negative or unknown status partner (29.6% vs. 24.0%) and have condomless sex with

an HIV-negative or unknown status partner while not being recently virally suppressed (5.8% vs. 2.7%) or durably suppressed (8.8% vs. 4.2%) (Table 2).

Homeless adults were significantly ( $p < .01$ ) more likely than housed adults to binge drink (19.6% vs 15.0%), use alcohol before or during sex (43.7% vs 36.8%), use non-injection drugs (41.5% vs 24.3%), use injection drugs (8.0% vs 1.7%), use drugs before or during sex (34.7% vs. 18.2%) and smoke (63.1% vs. 37.7%) (Table 2).

## Discussion

Approximately 8% of HIV-positive adults in HIV care experienced recent homelessness—higher than the national HIV prevention goal of 5% (ONAP, 2015). Like previous studies, we found that HIV-positive homeless adults were more likely than housed adults to report major depression and substance use (Aidala et al., 2005; Chen et al., 2013; Kidder et al., 2007; Kidder et al., 2008). Among homeless persons, depression has been associated with poor HIV treatment outcomes and drug use has been associated with poor medication adherence and reduced access to care (Chen et al., 2013; Friedman et al., 2009; Riley et al., 2003; Weiser et al., 2006). Thus, homelessness, depression and substance use challenge HIV care engagement, ART adherence, and viral suppression. Homeless adults in HIV care were more likely than housed adults to have condomless sex with an HIV-negative or unknown status partner, which aligns with a study indicating that homeless persons were more likely to have condomless sex with an unknown status partner than housed persons (Kidder et al., 2008).

Several studies have demonstrated the importance of housing on an HIV-positive person's health and the public's health more broadly (Aidala et al., 2007; Leaver, Bargh, Dunn, & Hwang, 2007; Wolitski et al., 2007). Housing assistance has been shown to increase retention in HIV care and adherence to ART, and has been associated with reduced drug use and condomless sex (Aidala et al., 2005; Aidala et al., 2007). Thus, housing may reduce ongoing transmission of HIV and may improve co-morbidities like depression and substance use. Policies and programs that promote access to housing and other basic needs for HIV-positive persons are needed (ONAP, 2015). The Housing Opportunity for Persons with AIDS (HOPWA) program is a Federal program dedicated to the housing needs of HIV-positive persons that has been associated with improved housing, mental health, and retention in HIV care for homeless or unstably housed persons (Terzian et al., 2015; U.S. Department of Housing and Urban Development; Wolitski et al., 2010). Continued funding for HOPWA may contribute to further success in HIV care and treatment for HIV-positive homeless persons. However, housing alone might not be enough. Retaining persons in housing may be time consuming—taking time away from providing important health and HIV prevention services (Henwood et al., 2018). In a longitudinal study, condomless sex remained high and exposure to HIV prevention programming decreased significantly even after homeless persons transitioned into housing (Wenzel et al., 2019).

Studies have shown that receipt of mental health services and drug treatment improves re-engagement in, and access to HIV care, respectively (Knowlton et al., 2001). Integrating ancillary services such as substance abuse treatment and mental health counseling with HIV

care may improve health outcomes for this key population already engaged in HIV care and experiencing several co-morbidities. The National Health Care for the Homeless Council's clinicians' network recommends that HIV care be flexible, holistic and client-centered, and provided by an interdisciplinary team of providers (Audain et al., 2013).

There are some limitations of this study. The behavioral data collected were self-reported and subject to social desirability and recall bias. Our data are cross-sectional, and causality cannot be inferred. Our measure of homelessness does not measure chronic homelessness or capture less extreme aspects of housing instability, such as doubling up or moving frequently; thus, our prevalence estimate may be lower than what might be found among persons experiencing any kind of housing instability and it is unclear how sociodemographic and behavioral characteristics might differ by disparate living arrangements. Additionally, our analysis only includes homeless adults who are receiving HIV care and aware of their HIV infection; therefore, our estimates of homelessness may be lower than what might be found among all homeless adults with diagnosed HIV. However, understanding the sociodemographic and behavioral characteristics of homeless adults receiving HIV care is still important since homeless persons tend to be at greatest risk of engaging in HIV risk behaviors compared to housed and unstably housed persons (Aidala et al., 2005). For HIV-positive homeless persons, improving health outcomes and reducing HIV risk behaviors requires that HIV care focus on addressing basic needs, such as housing, and integrating ancillary services with HIV care.

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## References

- Aidala A, Cross JE, Stall R, Harre D, & Sumartojo E (2005). Housing status and HIV risk behaviors: implications for prevention and policy. *AIDS Behav*, 9(3), 251–65. [PubMed: 16088369]
- Aidala AA, Lee G, Abramson DM, Messeri P, & Siegler A (2007). Housing need, housing assistance, and connection to HIV medical care. *AIDS Behav*, 11(6 Suppl), 101–15. [PubMed: 17768674]
- Aidala AA, Wilson MG, Shubert V, Gogolishvili D, Globerman J, Rueda S, ... Rourke SB (2016). Housing status, medical care, and health outcomes among people living with HIV/AIDS: A systematic review. *American Journal of Public Health*, 106(1), e1–e23.
- Audain G, Bookhardt-Murray LJ, Fogg CJ, Gregerso P, Haley CA, Luther P, Treherne L, & Knopf-Amelung S (2013). *Adapting your practice: Treatment and recommendations for unstably housed patients with HIV/AIDS*. Nashville, TN: Health Care for the Homeless Clinicians' Network, National Health Care for the Homeless Council, Inc.
- Bradley H, Frazier EL, Huang P, Fagan JL, Do A, Mattson CL, ... Skarbinski J (2010). Behavioral and clinical characteristics of persons receiving medical care for HIV infection Medical Monitoring Project, United States, 2010. HIV Surveillance Special Report 9. Retrieved from <https://>

[www.cdc.gov/hiv/pdf/statistics/systems/mmp/MMP\\_2010\\_surveillancesummary.pdf](http://www.cdc.gov/hiv/pdf/statistics/systems/mmp/MMP_2010_surveillancesummary.pdf). Accessed May 16, 2018.

- Centers for Disease Control and Prevention. Distinguishing public health research and public health nonresearch. (2010). Retrieved from <https://www.cdc.gov/od/science/integrity/docs/cdc-policy-distinguishing-public-health-research-nonresearch.pdf>. Accessed May 16, 2018.
- Chen NE, Meyer JP, Avery AK, Draine J, Flanigan TP, Lincoln T, ... Altice FL (2013). Adherence to HIV treatment and care among previously homeless jail detainees. *AIDS Behav*, 17(8), 2654–2666. [PubMed: 22065234]
- Clemenzi-Allen A, Geng E, Christopoulos K, Hammer H, Buchbinder S, Havlir D, & Ghandi 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), ofy035. [PubMed: 29577059]
- Christiani A, Hudson AL, Nyamathi A, Mutere M, & Sweat J (2008). Attitudes of homeless and drug-using youth regarding barriers and facilitators in delivery of quality and culturally sensitive health care. *J Child Adolesc Psychiatr Nurs*, 21(3), 154–63. [PubMed: 18667048]
- Frankel MR, McNaghten AD, Shapiro MF, Sullivan PS, Berry SH, Johnson CH, ... Bozzette SA (2012). A probability sample for monitoring the HIV-infected population in care the the U.S. and in selected states. *Open AIDS J, Suppl 1(M21)*, 67–76.
- Friedman MS, Marshall MP, Stall R, Kidder DP, Henny KD, Courtenay-Quirk C, ... Holtgrave DR (2009). Associations between substance use, sexual risk taking and HIV treatment adherence among homeless people living with HIV. *AIDS Care*, 21(6), 692–700. [PubMed: 19806485]
- Harris RA, Xue X, & Selwyn PA (2016). Housing stability and medication adherence among HIV-positive individuals in antiretroviral therapy: A meta-analysis of observational studies in the United States. *J Acquir Immune Defic Syndr*, 74(3), 309–317.
- Henwood BF, Harris T, Woo D, Winetrobe H, Rhoades H, & Wenzel SL (2018). Availability of comprehensive services in permanent supportive housing in Los Angeles. *Health Soc Care Community*, 26(2), 207–213. [PubMed: 28984074]
- Hsu HT, Wenzel S, Rice E, Gilreath TD, Kurzban S, & Unger J (2015). Understanding consistent condom use among homeless men who have sex with women and engage in multiple sexual partnerships: a path analysis. *AIDS Behav*, 19(9), 1676–88. [PubMed: 25845531]
- Iachan R, Johnson CH, Harding RL, Kyle T, Saaverdra P, Frazier EL, ... Skarbinski J Design and weighting methods for a nationally representative sample of HIV-infected adults receiving medical care in the United States- Medical Monitoring Project. *Open AIDS J*, 10, 164–181. [PubMed: 27651851]
- Kelly K, & Caputo T (2007). Health and street/homeless youth. *Journal of Health Psychology*, 12(5), 726–736. [PubMed: 17855458]
- Kidder DP, Wolitski RJ, Campsmith ML, & Nakamura GV (2007). Health status, health care use, medication use, and medication adherence among homeless and housed people living with HIV/AIDS. *American Journal of Public Health*, 97(12), 2238–2245. [PubMed: 17971562]
- Kidder DP, Wolitski RJ, Pals SL, & Campsmith ML (2008). Housing status and HIV risk behaviors among homeless and housed persons with HIV. *J Acquir Immune Defic Syndr*, 49(4), 451–5. [PubMed: 19186357]
- Klee H, & Reid P (1998). Drugs and youth homelessness: Reducing the risk. *Drugs: Education, Prevention and Policy*, 5(3), 269–280.
- Knowlton AR, Hoover DR, Chung SE, Celentano DD, Vlahov D, & Latkin CA (2001). Access to medical care and service utilization among injection drug users with HIV/AIDS. *Drug Alcohol Depend*, 64(1), 55–62. [PubMed: 11470341]
- Kroenke K, Strine TW, Spitzer RL, Williams JB, Berry JT, & Mokdad AH (2009). The PHQ-8 as a measure of current depression in the general population. *J Affect Disord*, 114, 163–173. [PubMed: 18752852]
- Leaver CA, Bargh G, Dunn JR, & Hwang SW (2007). The effects of housing on health-related outcomes in people living with HIV: a systematic review of the literature. *AIDS Behav*, 11(6 Suppl), 85–100. [PubMed: 17682940]

- Milloy MJ, Marshall BD, Montaner J, & Wood E (2012). Housing status and the health of people living with HIV/AIDS. *Current HIV/AIDS reports*, 9(4), 364–374. [PubMed: 22968432]
- Rao JNK, & Scott AJ (1992). A simple method for the analysis of clustered binary data. *Biometrics*, 48, 577–585. [PubMed: 1637980]
- Riley ED, Wu AW, Perry S, Clark RA, Moss AR, Crane J, & Bangsberg DR (2003). Depression and drug use impact health status among marginally housed HIV-infected individuals. *AIDS Patient Care STDS*, 17(8), 401–6. [PubMed: 13678541]
- Santa Maria D, Padhye N, Yang Y, Gallardo K, & Businelle M (2018). Predicting sexual behaviors among homeless young adults: ecological momentary assessment study. *JMIR Public Health Surveill*, 4(2), e39. [PubMed: 29636318]
- Terzian AS, Irvine MK, Hollod LM, Lim S, Rojas J, & Shepard CW (2015). Effects of HIV housing services on engagement in care and treatment, New York City, 2011. *AIDS and Behavior*, 19(11), 2087–2096. [PubMed: 25631320]
- Thakrar K, Morgan JR, Gaeta JM, Hohl C, & Drainoni ML (2016). Homelessness, HIV, and incomplete viral suppression. *Journal of Health Care for the Poor and Underserved*, 27(1), 145–156. [PubMed: 27528794]
- Tucker JS, Wenzel SL, Golinelli D, Kennedy DP, Ewing B, & Wertheimer S (2013). Understanding heterosexual condom use among homeless men. *AIDS Behav*, 17(15), 1637–1644. [PubMed: 22392155]
- Tucker JS, Ryan GW, Golinelli D, Munjas B, Wenzel SL, Kennedy DP, ... Zhou A (2012). Substance use and other risk factors for unprotected sex: Results from an event-based study of homeless youth. *AIDS Behav*, 16(6), 1699–1707. [PubMed: 21932093]
- U.S. Department of Health and Human Services (DHHS). (2009). Annual update of the HHS poverty guidelines. *Federal Register*, 74, 4199–4201.
- US Department of Housing and Urban Development. HOPWA. Washington, DC: The Office of HIDS/AIDS Housing.
- Weiser SD, Riley ED, Ragland K, Hammer G, Clark R, & Bangsberg DR (2006). Brief report: Factors associated with depression among homeless and marginally housed HIV-infected men in San Francisco. *J Gen Intern Med*, 21(1), 61–4. [PubMed: 16423125]
- Wenzel SL, Rhoades H, La Motte-Kerr W, Duan L, Harris T, Rice E, & Henwood BF (2019). Do HIV risk and prevention behaviors change over time among adults in permanent supportive housing? *AIDS Care*, 31(9), 1172–1177. [PubMed: 30724581]
- White House Office of National AIDS Policy. (2015). National HIV/AIDS strategy for the United States. Updated to 2020. Retrieved from <https://www.aids.gov/federal-resources/national-hiv-aids-strategy/overview/>
- Wolitski RJ, Kidder DP, & Fenton KA (2007). HIV, homelessness, and public health: critical issues and a call for increased action. *AIDS Behav*, 11(6 Suppl), 167–71. [PubMed: 17676279]
- Wolitski RJ, Kidder DP, Pals SL, Royal S, Aidala A, Stall R, ... Courtenay-Quirk C (2010). Randomized trial of the effects of housing assistance on the health and risk behaviors of homeless and unstably housed people living with HIV. *AIDS Behav*, 14(3), 93–503.

**Table 1.**

Selected characteristics of HIV-positive homeless adults receiving medical care in the United States --- Medical Monitoring Project, 2009 – 2015

Characteristics	Total		Homeless		Housed		P-value
	n	% <sup>†</sup> (95% CI)	n	% <sup>†</sup> (95% CI)	n	% <sup>†</sup> (95% CI)	
Total	28275	100%	2386	8.3 (7.8-8.9)	25886	91.7 (91.1-92.2)	
<b>Gender</b>							<.0001
Male	20307	72.6 (70.8-74.3)	1690	71.9 (69.6-74.2)	18617	72.6 (70.8-74.5)	
Female	7545	26.0 (24.2-27.8)	614	24.4 (22.2-26.6)	6931	26.1 (24.3-27.9)	
Transgender	408	1.4 (1.3-1.6)	80	3.7 (2.8-4.5)	328	1.2 (1.1-1.4)	
<b>Race/Ethnicity</b>							<.0001
White, non-Hispanic	8945	33.2 (29.2-37.3)	509	20.7 (17.0-24.4)	8436	34.4 (30.2-38.5)	
Black, non-Hispanic	11785	41.7 (36.5-47.0)	1262	53.2 (48.0-58.3)	10523	40.7 (35.3-46.0)	
Hispanic or Latino	6287	20.4 (16.9-23.9)	468	19.7 (16.6-22.9)	5819	20.5 (16.9-24.0)	
Other	1258	4.7 (4.1-5.2)	147	6.4 (5.0-7.8)	1111	4.5 (4.0-5.0)	
<b>Age Groups (in years)</b>							<.0001
18-29	2156	8.0 ( 7.3- 8.6)	263	12.1 (10.3-14.0)	1893	7.6 (6.9-8.2)	
30-39	4332	15.7 (15.1-16.3)	426	18.4 (16.5-20.2)	3906	15.5 (14.9-16.0)	
40-49	9369	33.0 (32.3-33.6)	873	36.0 (33.7-38.3)	8496	32.7 (32.0-33.4)	
50-59	8967	31.3 (30.6-32.0)	671	27.5 (25.4-29.6)	8296	31.6 (30.9-32.4)	
>=60	3451	12.1 (11.6-12.6)	153	6.0 (5.0-6.9)	3298	12.6 (12.1-13.2)	
<b>Education attainment</b>							<.0001
<High School	6085	20.9 (19.4-22.3)	805	33.6 (30.8-36.3)	5280	19.7 (18.3-21.1)	
High School diploma	7745	27.1 (25.9-28.3)	738	31.3 (29.2-33.4)	7007	26.7 (25.5-28.0)	
>High School	14434	52.0 (49.7-54.4)	841	35.1 (32.2-38.1)	13593	53.6 (51.2-55.9)	
<b>Poverty level</b>							<.0001
Above poverty level	14215	53.9 (51.6-56.2)	613	26.2 (23.7-28.7)	13602	56.4 (53.9-58.8)	
At or below poverty level	12974	46.1 (43.8-48.4)	1684	73.8 (71.3-76.3)	11290	43.6 (41.2-46.1)	
<b>Incarceration</b>							<.0001
No	26899	95.1 (94.7-95.4)	1926	80.4 (78.4-82.4)	24973	96.4 (96.1-96.7)	
Yes	1366	4.9 (4.6-5.3)	456	19.6 (17.6-21.6)	910	3.6 (3.3-3.9)	
<b>Type of health insurance</b>							<.0001
Any private insurance	8164	30.3 (28.0-32.6)	239	10.5 (8.4-12.6)	7925	32.1 (29.7-34.5)	
Public insurance only	14976	50.8 (48.7-53.0)	1635	66.2 (62.5-69.8)	13341	49.4 (47.3-51.6)	
Ryan White coverage only or Uninsured	4524	16.9 (14.9-19.0)	439	21.0 (17.3-24.8)	4085	16.5 (14.6-18.5)	
Unspecified	534	1.9 (1.6-2.3)	58	2.3 (1.6-3.0)	476	1.9 (1.5-2.3)	
<b>Length of time since HIV diagnosis (in years)</b>							<.0001
<5	5703	21.3 (20.5-22.2)	628	27.6 (25.1-30.1)	5075	20.8 (19.9-21.7)	

Characteristics	Total		Homeless		Housed		P-value
	n	% <sup>†</sup> (95% CI)	n	% <sup>†</sup> (95% CI)	n	% <sup>†</sup> (95% CI)	
5-9	5875	20.7 (20.1-21.4)	471	19.2 (17.4-20.9)	5404	20.9 (20.2-21.5)	
>=10	16685	57.9 (56.7-59.2)	1287	53.2 (50.4-56.0)	15398	58.4 (57.1-59.7)	
<b>Sexual Orientation</b>							<.0001
Homosexual	9478	41.8 (38.6-45.0)	548	28.6 (26.0-31.1)	8930	43.0 (39.6-46.3)	
Heterosexual	11429	48.5 (45.4-51.7)	1130	58.3 (54.9-61.8)	10299	47.7 (44.4-51.0)	
Bisexual	1893	8.2 (7.7-8.6)	226	11.4 (9.4-13.3)	1667	7.9 (7.4-8.3)	
Other/unclassified	322	1.5 (1.3-1.7)	31	1.8 (1.1-2.4)	291	1.5 (1.3-1.7)	
<b>Depression in past 2 weeks</b>							<.0001
No depression	21843	78.0 (77.0-79.0)	1516	64.7 (62.1-67.2)	20327	79.2 (78.2-80.2)	
Other depression	3100	11.2 (10.7-11.7)	356	15.1 (13.4-16.8)	2744	10.8 (10.4-11.3)	
Major depression	2996	10.8 (10.1-11.5)	475	20.2 (18.2-22.2)	2521	10.0 (9.3-10.7)	

Abbreviations: n = unweighted sample size; CI = Confidence interval;

Time period: During 12 months, unless otherwise noted. All measures are self-reported unless otherwise noted.

Race/ethnicity are mutually exclusive. Hispanic/Latinos could be of any race.

<sup>†</sup> weighted column percentage

<sup>‡</sup> Undetectable or < 200 copies/ml based on medical record abstraction data in the 12 months prior to interview.

**Table 2.**

Selected behaviors among HIV-positive homeless adults receiving medical care in the United States --- Medical Monitoring Project, 2009 – 2015

Characteristics	Total		Homeless		Housed		p value
	n	% <sup>†</sup> (95% CI)	N	% <sup>†</sup> (95% CI)	n	% <sup>†</sup> (95% CI)	
Total	28275	100%	2386	8.3 (7.8-8.9)	25886	91.7 (91.1-92.2)	
<b>Had any sex</b>							0.002
No	10682	38.4 (37.3-39.6)	847	35.4 (33.1-37.7)	9835	38.7 (37.6-39.8)	
Yes	17307	61.6 (60.4-62.7)	1501	64.6 (62.3-66.9)	15806	61.3 (60.2-62.4)	
<b>Had condomless sex<sup>‡</sup></b>							<.0001
No	20628	75.6 (74.1-77.0)	1606	70.4 (68.0-72.7)	19022	76.0 (74.6-77.5)	
Yes	6727	24.4 (23.0-25.9)	679	29.6 (27.3-32.0)	6048	24.0 (22.5-25.4)	
<b>Had condomless sex<sup>‡</sup> and not recently virally suppressed<sup>††</sup></b>							<.0001
No	26479	97.0 (96.8-97.3)	2148	94.2 (93.2-95.1)	24331	97.3 (97.0-97.6)	
Yes	813	3.0 (2.7-3.2)	129	5.8 (4.9-6.8)	684	2.7 (2.4-3.0)	
<b>Had condomless sex<sup>‡</sup> and not durably suppressed<sup>‡‡</sup></b>							<.0001
No	26027	95.4 (95.1-95.7)	2082	91.2 (90.0-92.5)	23945	95.8 (95.4-96.1)	
Yes	1265	4.6 (4.3-4.9)	195	8.8 (7.5-10.0)	1070	4.2 (3.9-4.6)	
<b>Binge drinker in past 30 days</b>							<.0001
No	23645	84.6 (84.1-85.1)	1896	80.4 (78.3-82.6)	21749	85.0 (84.4-85.5)	
Yes	4392	15.4 (14.9-15.9)	453	19.6 (17.4-21.7)	3939	15.0 (14.5-15.6)	
<b>Alcohol use before or during sex</b>							<.0001
No	10961	62.6 (61.4-63.9)	854	56.3 (53.3-59.4)	10107	63.2 (61.9-64.5)	
Yes	6346	37.4 (36.1-38.6)	643	43.7 (40.6-46.7)	5703	36.8 (35.5-38.1)	
<b>Any drug use</b>							<.0001
No	20815	73.8 (72.7-74.8)	1341	56.8 (54.4-59.2)	19474	75.3 (74.2-76.3)	
Yes	7346	26.2 (25.2-27.3)	1032	43.2 (40.8-45.6)	6314	24.7 (23.7-25.8)	
<b>Use of any non-injection drugs</b>							<.0001
No	20977	74.3 (73.2-75.3)	1387	58.5 (56.1-60.8)	19590	75.7 (74.7-76.7)	
Yes	7189	25.7 (24.7-26.8)	987	41.5 (39.2-43.9)	6202	24.3 (23.3-25.3)	
<b>Use of any injection drugs</b>							<.0001
No	27494	97.8 (97.3-98.3)	2150	92.0 (90.0-94.1)	25344	98.3 (97.9-98.7)	
Yes	682	2.2 (1.7-2.7)	223	8.0 (5.9-10.0)	459	1.7 (1.3-2.1)	
<b>Use of any drugs before or during sex</b>							<.0001
No	13937	80.3 (79.1-81.6)	978	65.3 (62.4-68.2)	12959	81.8 (80.5-83.0)	
Yes	3411	19.7 (18.4-20.9)	518	34.7 (31.8-37.6)	2893	18.2 (17.0-19.5)	
<b>Current smoker</b>							<.0001
No	17010	60.2 (58.9-61.5)	885	36.9 (34.3-39.5)	16125	62.3 (61.0-63.6)	

Characteristics	Total		Homeless		Housed		p value
	n	% <sup>†</sup> (95% CI)	N	% <sup>†</sup> (95% CI)	n	% <sup>†</sup> (95% CI)	
Yes	11154	39.8 (38.5-41.1)	1487	63.1 (60.5-65.7)	9667	37.7 (36.4-39.0)	

Abbreviations: n = unweighted sample size; CI = Confidence interval; ART = Antiretroviral medications;

Time period: Twelve months prior to interview unless otherwise noted. All measures are self-reported unless otherwise noted.

<sup>†</sup> weighted column percentage

<sup>‡</sup> Had condomless sex with a negative or unknown partner

<sup>††</sup> Undetectable or < 200 copies/ml based on medical record abstraction data in the 12 months prior to interview.

<sup>†††</sup> Undetectable or < 200 copies/ml at all viral load tests based on medical record abstraction data in the 12 months prior to interview.

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