

## Literature Review on Social Determinants of Health to Implement a National Quality Improvement Initiative: create+equity Collaborative

### Introduction and Background

Since the emergence of HIV/AIDS in the early 1980s, the global community has witnessed momentous innovations that have significantly changed the landscape of HIV care.<sup>1</sup> In particular, advancements in antiretroviral therapy (ART) over the last twenty years have transformed HIV/AIDS from a rapidly progressing ailment to what most consider a chronic disease,<sup>2</sup> offering a significantly increased life expectancy for people with HIV (PWH).<sup>3</sup> ART and medication adherence can lead to a significant reduction in viral load in the body, with the ultimate goal of reaching undetectable levels (viral suppression).<sup>4</sup> ART and viral suppression also play critical roles in the prevention of HIV transmissions. Recent studies demonstrate that persons achieving an undetectable viral load are unable to transmit HIV sexually, or treatment as prevention (HIV undetectable means untransmittable [U=U]).<sup>5,6</sup> Despite the clinical success of ART in viral suppression, reductions in HIV-related morbidity and mortality disproportionately impact specific subpopulations of PWH as a result of unequal access to care and variations in the quality of care provided.<sup>7</sup>

In alignment with national public health priorities and Ending the HIV Epidemic goals nationally, the Center for Quality Improvement & Innovation (CQII) in close collaboration with the Health Resources and Services Administration (HRSA) HIV/AIDS Bureau proposes to address social determinants of health as the key focus of its next national quality improvement collaborative, called create+equity Collaborative. Building upon the impact of its end+disparities ECHO Collaborative, in+care Campaign, and HIV Cross-Part Care Continuum Collaborative (H4C), CQII works toward reducing HIV-related disparities in key communities to ensure that all PWH are virally suppressed and achieve optimal health outcomes.

A new 18-month quality improvement learning collaborative will kick-off in January 2021 and focuses on reducing disparities in HIV care by addressing social determinants of health. The aim of this national initiative, managed by CQII, is to increase viral suppression rates in four subpopulations of PWH experiencing challenges with: housing instabilities, mental health, substance use, and age. The collaborative engages Ryan White HIV/AIDS Program (RWHAP)-

---

<sup>1</sup> U.S. Department of Health & Human Services. HIV.gov: Overview—a timeline of HIV/AIDS. Updated 2016. Available from <https://www.hiv.gov/hiv-basics/overview/history/hiv-and-aids-timeline>.

<sup>2</sup> Olalla G, Knobel H, Carmona A, Guelar A, López-Colomé JL, and Caylà JA. Impact of adherence and highly active antiretroviral therapy on survival in HIV-infected patients. *J Acquir Immune Defic Syndr*. 2002;30(1):105-110.

<sup>3</sup> Wandeler G, Johnson LF, Egger M. Trends in life expectancy of HIV-positive adults on ART across the globe: comparisons with general population. *Current Opinion in HIV and AIDS* 2016; 11(5): 492-500.

<sup>4</sup> Saag, M.S. & Holodniy, Mark & Kuritzkes, D.R. & O'Brien, W.A. & Coombs, R & Poscher, M.E. & Jacobsen, Donna & Shaw, G.M. & Richman, D.D. & Volberding, P.A.. (1996). HIV viral load markers in clinical practice. *Nature medicine*. 2. 625-9. 10.1038/nm0696-625.

<sup>5</sup> Alison J Rodger, Valentina Cambiano, Tina Bruun, et al. Risk of HIV transmission through condomless sex in serodifferent gay couples with the HIV-positive partner taking suppressive antiretroviral therapy (PARTNER): final results of a multicentre, prospective, observational study. *Lancet* 2019; 393: 2428–38.

<sup>6</sup> Eisinger RW, Dieffenbach CW, Fauci AS. HIV viral load and transmissibility of HIV infection: undetectable equals untransmittable. *JAMA* 2019 Feb 5; 321(5): 451-452. doi: 10.1001/jama.2018.21167.

<sup>7</sup> Wong MD, Cunningham WE, Shapiro MF, Andersen RM, Clearly PD, Duan N, et al.; HCSUS Consortium. Disparities in HIV treatment and physician attitudes about delaying protease inhibitors for nonadherent patients. *J Gen Intern Medicine*. 2004;19(4):366–374.

funded recipients and subrecipients nationwide across all RWHAP funding streams. The underlying collaborative framework for the upcoming collaborative uniquely bridges the Institute for Healthcare Improvement (IHI)'s Breakthrough Series model<sup>8</sup> with its emphasis on learning sessions and in-between action periods to carry out local improvement activities and the innovative Project Extension for Community Health Outcomes (ECHO) framework<sup>9</sup> with its focus on virtual case presentations. This hybrid framework facilitates virtual access to subject matter expertise and learning exchanges among participants using videoconferencing technologies for all collaborative activities.

This virtual community of practice model promotes an “all teach, all learn, all improve” paradigm.<sup>10</sup> The used communication platform (Zoom) increases opportunities for participants to attend a higher number of meetings while reducing in-person meeting barriers. Additionally, special interest groups (Affinity Groups) that focus on subpopulations targeted by this collaborative (housing, mental health, substance use, and age) hold routine virtual meetings (Affinity Sessions) to help participants gain subpopulation-specific knowledge, promote peer sharing and exchange, and provide feedback on quality improvement implementation processes from both a peer and expert perspective.

### **Social Determinants of Health among People with HIV**

Despite major advances in HIV prevention and treatment, it is estimated that only about 53% of the 1.1 million persons with HIV in the United States are virally suppressed.<sup>11</sup> This suggests that many PWH experience barriers to care and treatment, which contributes to the plateau in annual new HIV diagnoses in recent years.<sup>12</sup> Reducing HIV transmission requires keeping PWH in care along the HIV care continuum, which is attributed to various factors within the medical system as well as social and structural conditions in the community and societal contexts, known as the social determinants of health. These factors pose barriers to sustained engagement in care and treatment success, and an opportunity to overcome such barriers to enhance health outcomes for PWH.

The Department of Health and Human Services' Healthy People 2020<sup>13</sup> defines social determinants of health as “conditions in the environments in which people are born, live, learn, work, play, worship, and age that affect a wide range of health, functioning, and quality-of-life outcomes and risks.” Addressing social determinants of health among PWH is a national priority included in the National HIV/AIDS Strategy for the United States: Updated to 2020 under Goal 1 (Reducing New HIV Infections) and Goal 3 (Reducing HIV-Related Disparities and Health Inequities). Since 2017, several initiatives undertaken by federal agencies have sought to reach

---

<sup>8</sup> The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. *IHI Innovation Series* White Paper. Institute for Healthcare Improvement, 2003.

<sup>9</sup> University of New Mexico Project ECHO website. <https://echo.unm.edu>. Accessed April 18, 2020.

<sup>10</sup> Nembhard IM. All teach, all learn, all improve?: The role of interorganizational learning in quality improvement collaboratives *Health Care Manage Rev* 2012 Apr-Jun; 37(2): 154-64.

<sup>11</sup> Centers for Disease Control and Prevention, HIV in the United States and dependent areas. <https://www.cdc.gov/hiv/statistics/overview/ata glance.html>. Accessed April 29, 2020.

<sup>12</sup> Centers for Disease Control and Prevention. HIV Incidence: Estimated Annual Infections in the U.S., 2010-2016. <https://www.cdc.gov/nchhstp/newsroom/2019/HIV-incidence.html>. Published February 27, 2019. Accessed June 28, 2020.

<sup>13</sup> <https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health>

high-risk populations through housing, behavioral health, and substance use programs, which demonstrates precedence of ameliorating social determinants of health for PWH.<sup>14</sup>

This Literature Review provides an overview and rationale for selecting the proposed Affinity Group content areas for the create+equity Collaborative (housing, mental health, substance use, and age across the lifespan) by describing the individual and population-based benefits congruent with improving HIV care for PWH struggling with social determinants of health.

<a href="#">Housing</a>	4
<a href="#">Mental Health</a>	6
<a href="#">Substance Use</a>	8
<a href="#">Age</a>	11

The logo for create+equity collaborative, featuring a stylized plus sign with four colored segments (red, blue, purple, teal).

[Learn More | create+equity Collaborative](#)

---

<sup>14</sup> U.S. Department of Health and Human Services' Office of HIV/AIDS and Infectious Disease Policy. *National HIV/AIDS Strategy for the United States: Updated to 2020*; Progress Report 2017.

## *Housing*

According to the 2018 Ryan White HIV/AIDS Program Service Report (RSR), approximately 7.7% of RWHAP clients have temporary housing and 5.3% have unstable housing. While an increase in the percentage of clients with stable housing was seen, from 83.5% in 2014 to 87.0% in 2018, a slight increase was seen in the percentage of clients with unstable housing (from 4.7% in 2014 to 5.3% in 2018). In 2018, by age group, the highest percentages of temporary or unstable housing were among those aged 20-24 years (11.1%, 6.4% respectively), 25-29 years (10.7%, 7.1%), and 30-34 years (10.2%, 6.9%).<sup>15</sup>

In 2018, viral suppression has improved in RWHAP patients experiencing housing instabilities, but still face much lower levels of viral suppression in comparison to those with stable housing. About 72.4% of patients with unstable housing reached viral suppression and 80.7% in those with temporary housing, while viral suppression was at 88.4% in patients with stable housing.<sup>16</sup> Younger age groups that are unstably housed also experienced lower rates of viral suppression; those 20-24 and 25-29 years old were virally suppressed at a rate of 63.1% and 66.5% respectively.

People experiencing housing instabilities also had poor retention in HIV care. Approximately, 74.8% of people with unstable housing and 76.4% of those with temporary housing were retained in care, compared to 82.1% in those with stable housing. Among those with unstable housing, younger age groups were retained in HIV care at lower rates than older age groups, with those ages 15-19 years of age being retained at a rate of 66.7%, those 20-24 being retained at a rate of 68.4%, and those 25-29 retained at 68.9%.<sup>10</sup> Retention in care rates also varied among races, with unstably housed American Indians/Native Alaskans experiencing a retention in care rate of 68.4%. Transgender individuals who are unstably housed at 71.5% compared to stably housed transgender at 80.5%. Transgender men with stable housing have the highest percentage of viral suppression (89.8%) of any gender group while transgender women with unstable housing were virally suppressed at a rate of 67.3%.

Housing instability encompasses a variety of different conditions. One study focused on 6 different living arrangements (rent/own, treatment center/transitional housing, single room occupancy/hotel, friend, shelter, and outdoors) and found that only 42% of patients in the outdoors/in vehicle group were virally suppressed, with the second least virally suppressed group being those that stay in shelters (59%).<sup>17</sup> Patients in hotels and single room occupancy also showed lower levels of viral suppression at 70%.

A 3-year study in San Francisco focused on women living in homeless shelters, low-income hotels, and using free meal programs.<sup>18</sup> It found that the likelihood of unsuppressed viral loads

<sup>15</sup> Health Resources and Services Administration. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018. <http://hab.hrsa.gov/data/data-reports>. Published December 2019. Accessed June 2020.

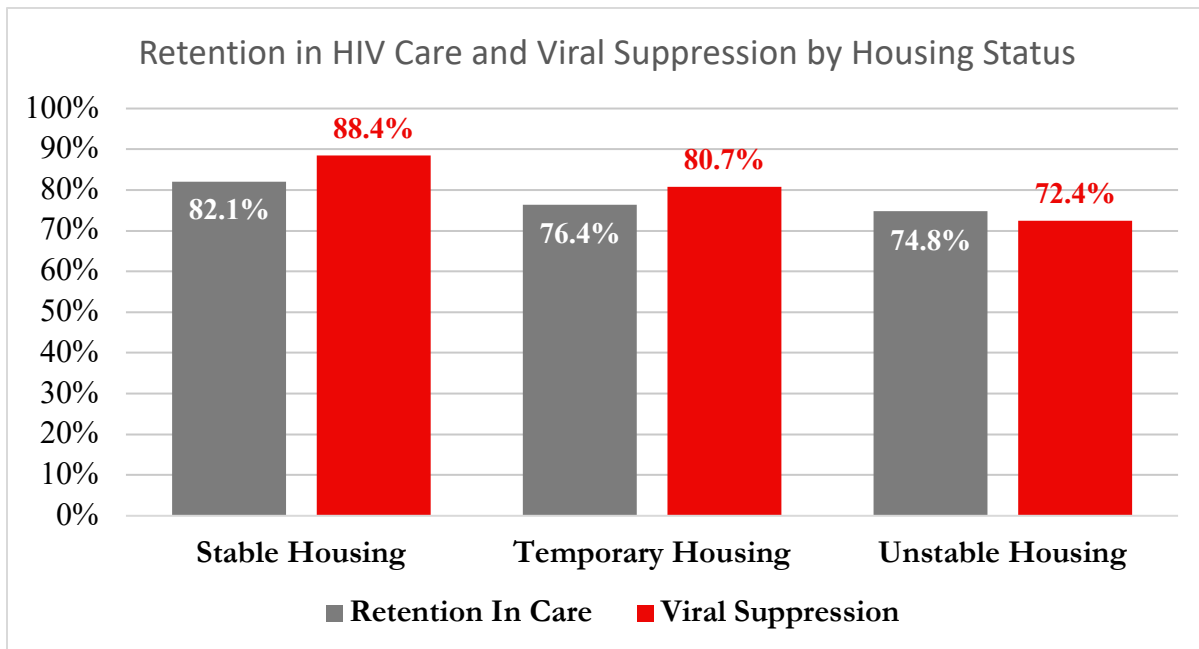
<sup>16</sup> Health Resources and Services Administration. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018. <http://hab.hrsa.gov/data/data-reports>. Published December 2019. Accessed June 2020.

<sup>17</sup> Clemenzi-Allen A, Geng E, Christopoulos K, et al. Degree of Housing Instability Shows Independent “Dose-Response” With Virologic Suppression Rates Among People Living With Human Immunodeficiency Virus. *Open Forum Infect Dis*. 2018;5(3). doi:10.1093/ofid/ofy035

<sup>18</sup> Riley ED, Vittinghoff E, Koss CA, et al. Housing First: Unsuppressed Viral Load Among Women Living with HIV in San Francisco. *AIDS Behav*. 2019;23(9):2326-2336. doi:10.1007/s10461-019-02601-w

was 11% higher for every 10 nights spent sleeping on the street and 16% for every 10 nights spent sleeping in a shelter. Unsuppressed viral loads were also higher among women who had experienced incarceration (3 times higher). Strikingly, only 40% of women experiencing housing instability who participated in the study achieved viral suppression throughout the study.

**Figure 1: Viral Suppression and Retention Rates by Housing Status<sup>19</sup>**



Unstable housing status was a predictive factor in hospital readmissions among HIV patients.<sup>20</sup> A study was conducted in New York State and involved 23,544 index hospitalizations. This study emphasized the potential to save costs on hospitalizations by providing supportive housing. Another study in New York City took a look at supportive housing applicants with HIV and found that individuals not in supportive housing had a higher risk of death (causes of death were unknown to investigators) and AIDS diagnosis compared to those with supportive housing.<sup>21</sup>

Food, housing, and transportation insecurities have a measurable impact on adherence to ART. Conducted in Atlanta, Georgia, a study found that lacking access to housing showed to be correlative with lowered ART adherence. This was indirectly through three important pathways: lacking social support, less access to services, and lower self-efficacy.<sup>22</sup>

<sup>19</sup> Health Resources and Services Administration. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018. <http://hab.hrsa.gov/data/data-reports>. Published December 2019. Accessed June 2020.

<sup>20</sup> Feller DJ, Akiyama MJ, Gordon P, Agins BD. Readmissions in HIV-Infected Inpatients: A Large Cohort Analysis. *JAIDS J Acquir Immune Defic Syndr*. 2016;71(4):407–412. doi:10.1097/QAI.0000000000000876

<sup>21</sup> Hall G, Singh T, Lim S woo. Supportive Housing Promotes AIDS-Free Survival for Chronically Homeless HIV Positive Persons with Behavioral Health Conditions. *AIDS Behav*. 2019;23(3):776-783. doi:10.1007/s10461-019-02398-8

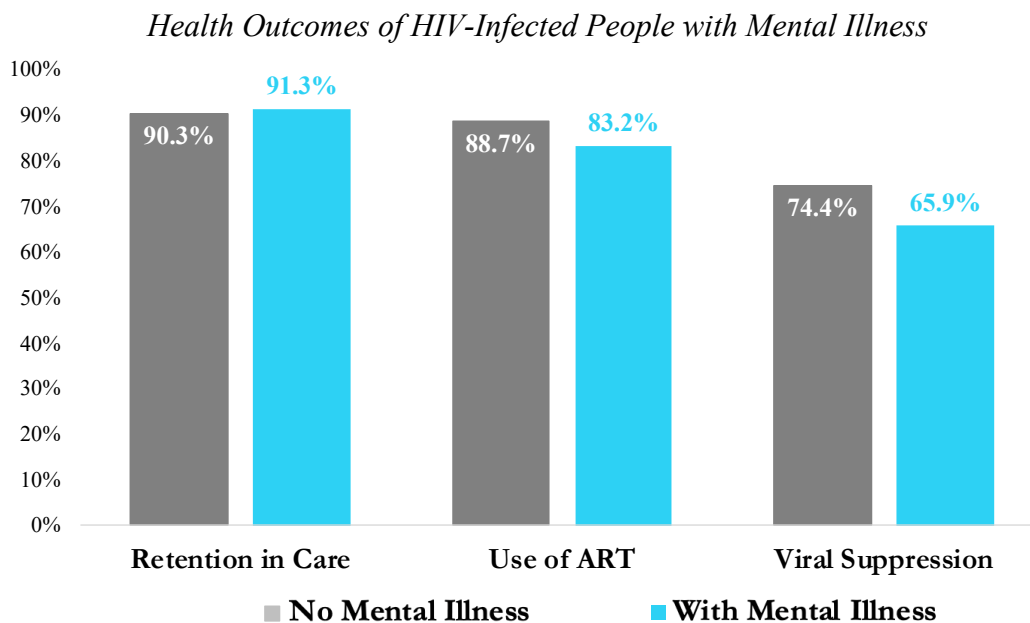
<sup>22</sup> Cornelius T, Jones M, Merly C, Welles B, Kalichman MO, Kalichman SC. Impact of food, housing, and transportation insecurity on ART adherence: a hierarchical resources approach. *AIDS Care*. 2017;29(4):449-457. doi:10.1080/09540121.2016.1258451

## Mental Health

Those individuals with HIV are likely to experience mental health conditions, most commonly depression and anxiety. The Centers for Disease Control and Prevention (CDC) found that 18% of people diagnosed with HIV in the United States have depression (with 10% of those suffering from major depression) and 22% had experienced anxiety.<sup>23</sup> A meta-analysis of studies found that depression was reported among over 15% of HIV patients across all age categories (adults 15.5%, 95% CI 12.8%–18.3%; adolescents 25.7%, 95% CI 17.7%–33.6%; children 15.1%, 95% CI 3.9%–26.3%).<sup>24</sup>

A 2015 study at the University of Pennsylvania analyzed the health outcomes of PWH with mental illness and reported that individuals with mental illness were 5.5% less likely to be prescribed antiretroviral therapy (83.2 vs. 88.7%; OR 0.63, 95% CI 0.42-0.95), and also 8.5% less likely to achieve viral suppression (65.9 vs. 74.4%; OR 0.66, 95% CI 0.49-0.90) compared to those who do not have a mental health diagnosis.<sup>25</sup>

**Figure 2: Viral Suppression, Retention and Adherence Rates by Mental Health Condition<sup>26</sup>**



Exploring the association between increased chronicity of depression and its impact on affected HIV care continuum indicators a study concluded that if someone was affected with depression

<sup>23</sup> Centers for Disease Control and Prevention. Behavioral and Clinical Characteristics of Persons with Diagnosed HIV Infection—Medical Monitoring Project, United States, 2018 Cycle (June 2018–May 2019). HIV Surveillance Special Report 25. <https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published May 2020. Accessed June 19, 2020.

<sup>24</sup> Shubber Z, Mills EJ, Nachega JB, Vreeman R, Freitas M, Bock P, et al. (2016) Patient-Reported Barriers to Adherence to Antiretroviral Therapy: A Systematic Review and Meta-Analysis. *PLoS Med* 13(11): e1002183. <https://doi.org/10.1371/journal.pmed.1002183>

<sup>25</sup> Yehia BR, Stephens-Shield AJ, Momplaisir F, et al. Health Outcomes of HIV-Infected People with Mental Illness. *AIDS Behav*. 2015;19(8):1491-1500. doi:10.1007/s10461-015-1080-4

<sup>26</sup> Yehia BR, Stephens-Shield AJ, Momplaisir F, et al. Health Outcomes of HIV-Infected People with Mental Illness. *AIDS Behav*. 2015;19(8):1491-1500. doi:10.1007/s10461-015-1080-4

for a longer period of time, they were more likely to miss HIV primary care appointments, lack viral suppression, and have increased mortality rate.<sup>27</sup> Out of the 55,040 scheduled appointments during this study, 10,361, or 18.8%, were missed, and 21.8% of viral loads were detectable.

Youths with HIV have high rates of psychiatric disorders, including depression. A study stated that “depression among youths with HIV and AIDS has been associated with decreased adherence to ART, decreased treatment engagement, increased substance use, unsafe sex practices, and poor viral suppression.”<sup>28</sup>

Other than depression, post-traumatic stress disorder (PTSD) and trauma are two mental health problems among PWH, which hinder their treatment. For women with HIV, trauma goes hand and hand with the disease and is “increasingly recognized as a near-universal experience.”<sup>29</sup> Trauma can include a broad spectrum of past and current problems, some of which being childhood and/or adult physical, sexual, or emotional abuse or neglect, as well as sociostructural violence, and is associated with psychiatric disorders, such as depression, anxiety, and PTSD. It is important to note that approximately 30% of women with HIV also are struggling with PTSD, and the duration of HIV infection can even lead to an intensification of PTSD symptoms.<sup>30</sup>

A 2015 study in the San Francisco Bay Area examined the connection between trauma and undetectable viral load among women. The results showed that 33% met the diagnostic criteria for PTSD, 41.8% had at least moderate levels of depression symptoms, and 27.3% reported at least moderate levels of anxiety symptoms. In addition, the study found that lifetime trauma was significantly associated with poor adherence to ART. Every additional trauma experienced led to reduced odds of even being on ART medication (odds ratio [OR], 0.81;  $p \frac{1}{4}$  .016), and those with higher trauma experiences had significantly lower odds of reporting good 30-day HIV medication adherence (OR, 0.84;  $p \frac{1}{4}$  .043).

A recent study took into account the prevalence of HIV among those with psychiatric disorders, which is four times higher than the general public's prevalence.<sup>31</sup> The study was conducted to assess HIV viral suppression among psychiatric inpatients who struggled with co-morbid substance use. Interestingly, the results showed that 52% of the participants were virally suppressed, which was higher than they expected, but the authors acknowledged that these patients were already in care for their mental health, which was probably one reason for this outcome. The study concluded that adherence to mental health treatment was a feasible way to improve individuals' viral suppression rates.

---

<sup>27</sup> Pence BW, Mills JC, Bengtson AM, et al. Association of Increased Chronicity of Depression With HIV Appointment Attendance, Treatment Failure, and Mortality Among HIV-Infected Adults in the United States. *JAMA Psychiatry*. 2018;75(4):379-385. doi:10.1001/jamapsychiatry.2017.4726

<sup>28</sup> Benton TD, Kee Ng WY, Leung D, Canetti A, Karnik N. Depression among Youth Living with HIV/AIDS. *Child Adolesc Psychiatr Clin N Am*. 2019;28(3):447-459. doi:10.1016/j.chc.2019.02.014

<sup>29</sup> Cuca YP, Shumway M, Machtinger EL, et al. The Association of Trauma with the Physical, Behavioral, and Social Health of Women Living with HIV: Pathways to Guide Trauma-informed Health Care Interventions. *Womens Health Issues*. 2019;29(5):376-384. doi:10.1016/j.whi.2019.06.001

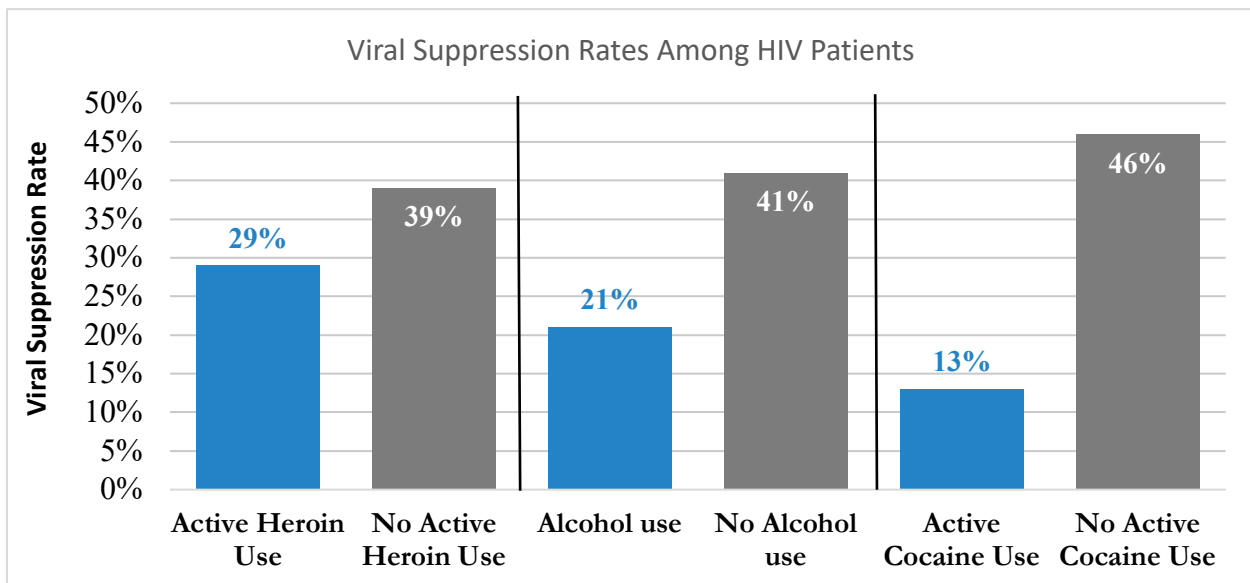
<sup>30</sup> Neigh GN, Rhodes ST, Valdez A, Jovanovic T. PTSD co-morbid with HIV: Separate but equal, or two parts of a whole?. *Neurobiol Dis*. 2016;92(Pt B):116-123. doi:10.1016/j.nbd.2015.11.012

<sup>31</sup> Coviello DM, Lovato R, Apostol K, et al. Prevalence of HIV Viral Load Suppression Among Psychiatric Inpatients with Comorbid Substance Use Disorders. *Community Ment Health J*. 2018;54(8):1146-1153. doi:10.1007/s10597-018-0284-2

### Substance Use

Substance use remains a widespread condition that thwarts proper care among PWH. The CDC estimates that drug use is apparent at 33.3% while injection drug users account for 2.9% of people with diagnosed HIV.<sup>32</sup> About 63.2% of people with diagnosed HIV drink alcohol to varying degrees and 16.9% reported engaging in binge drinking in the previous 30 days.<sup>33</sup> Injected drugs pose a dual threat in the fight to end the HIV epidemic, as they are also responsible for up to 7% of yearly HIV transmissions.<sup>34</sup>

**Figure 3: Viral Suppression among Substance Users<sup>35</sup>**



People who inject drugs are not only at a high risk for HIV infection but also face disparities in HIV outcomes. A meta-analysis of data reported by 28 U.S. jurisdictions discovered that, among 80,958 PWH who inject drugs, only 49.7% were retained in care and 42.8% had achieved viral suppression.<sup>36</sup>

The 2018 RSR data shed additional light on the disparities in retention in care and viral suppression. Approximately, 82.1% of people with HIV attributed to injection drug use were retained in care, though that rate decreased significantly among young people in the 20-24 age

<sup>32</sup> Centers for Disease Control and Prevention. *Behavioral and Clinical Characteristics of Persons with Diagnosed HIV Infection – Medical Monitoring Project, United States, 2018 Cycle (June 2018 – May 2018)*. HIV Surveillance Special Report 25. <https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published May 2020. Accessed June 2020.

<sup>33</sup> Centers for Disease Control and Prevention. *Behavioral and Clinical Characteristics of Persons with Diagnosed HIV Infection – Medical Monitoring Project, United States, 2018 Cycle (June 2018 – May 2018)*. HIV Surveillance Special Report 25.

<sup>34</sup> Centers for Disease Control and Prevention. *HIV Surveillance Report, 2018 (updated)*. Vol.31. <http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published May 2020. Accessed June 2020.

<sup>35</sup> Yehia BR, Stephens-Shield AJ, Momplaisir F, et al. Health Outcomes of HIV-Infected People with Mental Illness. *AIDS Behav*. 2015;19(8):1491-1500. doi:10.1007/s10461-015-1080-4

<sup>36</sup> Karch DL, Gray KM, Shi J, Hall HI. HIV Infection Care and Viral Suppression Among People Who Inject Drugs, 28 U.S. Jurisdictions, 2012-2013. *Open AIDS J*. 2016;10:127-135. Published 2016 Jun 15. doi:10.2174/1874613601610010127



range (61.5%) and 25-29 age range (64.5%).<sup>37</sup> Furthermore, while viral suppression for patients with HIV attributed to injection drug use (13 years and older) was 86.4%, certain subpopulations among people with HIV attributed to injection drug use have lower viral suppression rates, including only 85.1% of women, 84.8% of those living between 0-100% of the federal poverty level, 77.8% of those with no health care coverage, and 71.8% of unstably housed people with HIV attributed to injection drug use.

A recent study at the University of South Carolina found clear relationships between substance use and incomplete virologic suppression. Studying a cohort of HIV patients in which 60% were virally suppressed, researchers determined that the use of alcohol, cannabis, and/or cocaine was directly associated with incomplete virologic suppression.<sup>38</sup> Opioid use was, surprisingly, the least prevalent coded substance related disorder in the study, though the researchers explain that underreporting can occur because prescription opiate use is so common, making it challenging to distinguish between appropriate and inappropriate use.

Substance use disorders have been shown to affect viral suppression. A study conducted among PWH in Boston who were taking ART found that drug dependence was significantly associated with <90% ART adherence as well as viral load detection ( $\geq 200$  copies/mL).<sup>39</sup> Substance use and substance use disorders can also act as a barrier for PWH to ART adherence. A meta-analysis of 125 studies on barriers to ART conducted between 1997 and 2016, involving more than 17,000 individuals, revealed that alcohol and drug misuse were among the most common obstacles to ART adherence, as 12.9% of adults and 28.8% of adolescents in the studies self-reported substance use as detrimental to their adherence.<sup>40</sup>

Another study focused on the impact of active drug use on antiretroviral therapy adherence and viral suppression on PWH. Based on the data, 52% of individuals who use substances were unable to reach viral suppression, having a mean HIV RNA of 500 copies/mL and greater. Particularly with cocaine, 13% of active cocaine users were able to maintain viral suppression, whereas 46% of non-users were able to do the same. Furthermore, the study was able to conclude that active cocaine use can be a strong predictor of failure to maintain viral suppression.<sup>41</sup>

Focusing on associations between substance use and ART non-adherence, heavy drinking, and drug use were highly detrimental to ART adherence. Daily heavy drinking was associated with five times greater likelihoods of same-day ART non-adherence, while individuals using illicit drugs were nearly twice as likely to not adhere to their ART treatment plan.<sup>42</sup> Another study determined that women with HIV who increased their drinking habits, either by becoming heavy

<sup>37</sup> Health Resources and Services Administration. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018. <http://hab.hrsa.gov/data/data-reports>. Published December 2019.

<sup>38</sup> Tolson C, Richey LE, Zhao Y, et al. Association of Substance Use With Hospitalization and Virologic Suppression in a Southern Academic HIV Clinic. *Am J Med Sci*. 2018;355(6):553-558. doi:10.1016/j.amjms.2018.03.002

<sup>39</sup> Nolan S, Walley AY, Herren TC, Patts GJ, Ventura AS, Sullivan MM et al. *HIV-Infected Individuals Who Use Alcohol and Other Drugs, and Virologic Suppression*. *AIDS Care*. 2017. 29(9):1129-1136.

<sup>40</sup> Shubber Z, Mills EJ, Nachega JB, Vreeman R, Freitas M, et al. Patient-Reported Barriers to Adherence to Antiretroviral Therapy: A Systematic Review and Meta-Analysis. *PLOS Medicine*. 2016. 13(11): e1002183. <https://doi.org/10.1371/journal.pmed.1002183>

<sup>41</sup> Arnsten JH, Demas PA, Grant RW, et al. Impact of active drug use on antiretroviral therapy adherence and viral suppression in HIV-infected drug users. *J Gen Intern Med*. 2002;17(5):377-381. doi:10.1046/j.1525-1497.2002.10644.

<sup>42</sup> Ramsey SE, Ames EG, Uber J, Habib S, Clark S, Waldrop-Valverde D. Same-Day Associations Between Substance Use and Medication Non-adherence Among Persons Living with HIV. *Subst Abuse*. 2019;13:1178221819878751. Published 2019 Oct 3. doi:10.1177/1178221819878751

drinkers or binge drinkers, were less likely to be adherent to their ART medication or suppress their viral load than women who maintained their status as non-heavy or infrequent binge drinkers.<sup>43</sup>

Additional studies have shown that the use of other illicit substances, such as opioids, methamphetamines, and heroin, can result in higher rates of unsuppressed viral loads. Among PWH, an estimated 6.1% used some form of methamphetamine in the previous 12 months, while 3.1% reported using crack.<sup>44</sup> In 2019, a team of researchers showed that all three use patterns, intermittent use-inactive (aOR = 1.24, 95% CI = 1.03–1.49), intermittent use-active (aOR = 1.68, 95% CI = 1.36–2.06), and persistent use (aOR = 2.21, 95% CI = 1.69–2.89) were independently associated with unsuppressed viral loads, with persistent use the most strongly linked.

Often, mental health issues and substance use disorders intersect, further increasing the chances of ART non-adherence and low viral suppression rates. A 2019 study of psychiatric inpatients with substance use disorders found that these co-morbidities greatly reduced the likelihood of viral suppression, particularly disorders involving opioid use. Recent opioid users in the study were “six times more likely to have a detectable viral load than non-opioid users (OR 6.0; CI 1.1-31.7,  $p = .035$ ).”<sup>45</sup> This study affirms that individuals with mental illness and substance use are particularly vulnerable to limited success with ART treatment, and require “constant surveillance, monitoring, and supportive services to achieve viral suppression.”

---

<sup>43</sup> Barai N, Monroe A, Lesko C, et al. The Association Between Changes in Alcohol Use and Changes in Antiretroviral Therapy Adherence and Viral Suppression Among Women Living with HIV. *AIDS Behav.* 2017;21(7):1836-1845. doi:10.1007/s10461-016-1580-x

<sup>44</sup> Centers for Disease Control and Prevention. *Behavioral and Clinical Characteristics of Persons with Diagnosed HIV Infection – Medical Monitoring Project, United States, 2018 Cycle (June 2018 – May 2018)*. HIV Surveillance Special Report 25. <https://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>. Published May 2020. Accessed June 2020.

<sup>45</sup> Coviello DM, Lovato R, Apostol K, et al. Prevalence of HIV Viral Load Suppression Among Psychiatric Inpatients with Comorbid Substance Use Disorders. *Community Ment Health J.* 2018;54(8):1146-1153. doi:10.1007/s10597-018-0284-2

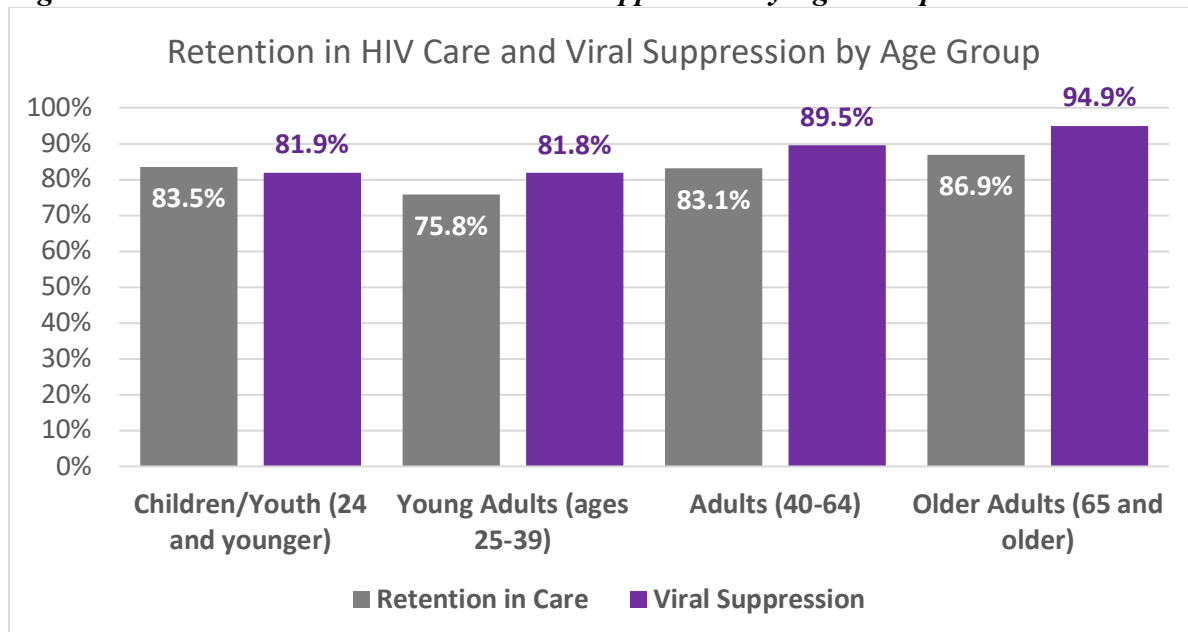
## Age

In the context of this Collaborative, this Affinity Group does not only refer to elderly individuals with HIV but rather, aging over the entire lifespan of PWH. The Age Affinity Group defined the following age categories: children/youth (ages 24 and younger), young adults (ages 25-39), adults (ages 40-64), and older adults (ages 65 and above).

The CDC reported that of the 37,968 new HIV diagnoses in the United States in 2018, 21% were among youth and 17% were among people ages 50 and older.<sup>46</sup> According to the 2018 RSR data,<sup>47</sup> approximately 4.1% of RWHAP clients with HIV fall under children/youth, 27.7% are young adults, 60.7% are adults, and 7.5% are classified as older adults, using the create+equity Collaborative age categories.

Overall, viral suppression rates have improved for RWHAP clients across all age groups, but young adults and children/youth face much lower levels of viral suppression in comparison to adults and older adults. In comparison to the average viral suppression rate across all age groups of 87.1% in 2018, 81.9% of children/youth reached viral suppression, and 81.8% of young adults, while the viral suppression rate was at 89.52% for adults. The age group exhibiting the highest rate of viral suppression is older adults (94.9%) and has demonstrated a slight increase of 2.9% from 2014 to 2018. Young adults (ages 25-39) and children/youth (24 and younger) have maintained the lowest viral suppression rates throughout the same four years.

**Figure 4: Retention in HIV Care and Viral Suppression by Age Group<sup>48</sup>**



<sup>46</sup> Centers for Disease Control and Prevention (CDC) Website. <https://www.cdc.gov/hiv/group/age/olderamericans/index.html>

<sup>47</sup> Health Resources and Services Administration. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018. <http://hab.hrsa.gov/data/data-reports>. Published December 2019. Accessed June 2020

<sup>48</sup> Health Resources and Services Administration. Ryan White HIV/AIDS Program Annual Client-Level Data Report 2018. <http://hab.hrsa.gov/data/data-reports>. Published December 2019. Accessed June 2020

Using the same 2018 RSR data, younger RWHAP clients are also less likely to be retained in HIV care. Approximately, 83.5% of children/youth and 75.8% of young adults were successfully retained in care, compared to 83.1% of adults and 86.9% of older adults. Older adults exhibited the highest rates of retention in HIV care, maintaining 85.6% to 86.9% from 2014 to 2018. The RWHAP client age group with the lowest rate of retention continues to be young adults (76.2%, 75.8% respectively), while children/youth and adults remain stable around 83% (83.4%-83.5%, 82.52%-83.12%). Children/youth is the only age group where retention in HIV care has decreased over time.

Co-morbidities have started to come into focus as the United States experience a shift towards an older HIV-infected population. As a result, there is limited information examining aging-associated noncommunicable co-morbidities (AANCCs) among younger populations, such as those under the age of 40.<sup>49</sup> One study examining co-morbidities among people with HIV identified 29% of participants had at least one co-morbidity; the most common were hepatitis, followed mental health disorders, and cardiovascular disease.<sup>50</sup> Another study found that significantly more HIV-infected individuals had  $\geq 1$  aging-associated noncommunicable co-morbidities (69.4% vs 61.8%;  $p=0.009$ ).<sup>51</sup> While smoking has negative consequences on the health of all individuals, PWH are 6 to 13 times more likely to die of lung cancer than AIDS-related causes.<sup>52</sup>

A recent JAMA Network Open article suggests that the occurrence of a premature onset of age-associated HIV co-morbidities beginning at approximately 36 years of age.<sup>53</sup> Furthermore, the authors state that current screening tools are not adequate for individuals with HIV and HIV-specific tools for early co-morbidity detection should be implemented. Finally, recent data suggest that non-HIV specific risk factors, including sociodemographic characteristics, may have a stronger association with co-morbidities development than factors specific to HIV infections.<sup>54</sup>

While younger people with HIV may have lower levels of co-morbidities as seen in older individuals, youth do face their own challenges that affect retention in care and viral suppression. Young people aged 18 to 24 are more likely than older people to be living in households with low-income levels, recently homeless, or uninsured; all barriers to achieving viral suppression and retention in care.<sup>55</sup> Another challenge posed to youth is the transition from pediatric care to

---

<sup>49</sup> CDC -

<https://www.cdc.gov/hiv/group/age/olderamericans/index.html#:~:text=People%20aged%2050%20and%20older%20may%20start%20treatment%20late%2C%20which,delay%20for%20any%20age%20group.>

<sup>50</sup> Lorenc A, Ananthavaran P, Lorigan J, Jowata M, Brook G, Banarsee R. The prevalence of comorbidities among people living with HIV in Brent: a diverse London Borough. *London J Prim Care (Abingdon)*. 2014;6(4):84-90. doi:10.1080/17571472.2014.11493422

<sup>51</sup> Judith Schouten, Cross-sectional Comparison of the Prevalence of Age-Associated Comorbidities and Their Risk Factors Between HIV-Infected and Uninfected Individuals: The AGE<sub>HIV</sub> Cohort Study, *Clinical Infectious Diseases*, Volume 59, Issue 12, 15 December 2014, Pages 1787–1797, <https://doi.org/10.1093/cid/ciu701>

<sup>52</sup> <https://www.hiv.gov/hiv-basics/staying-in-hiv-care/other-related-health-issues/smoking>

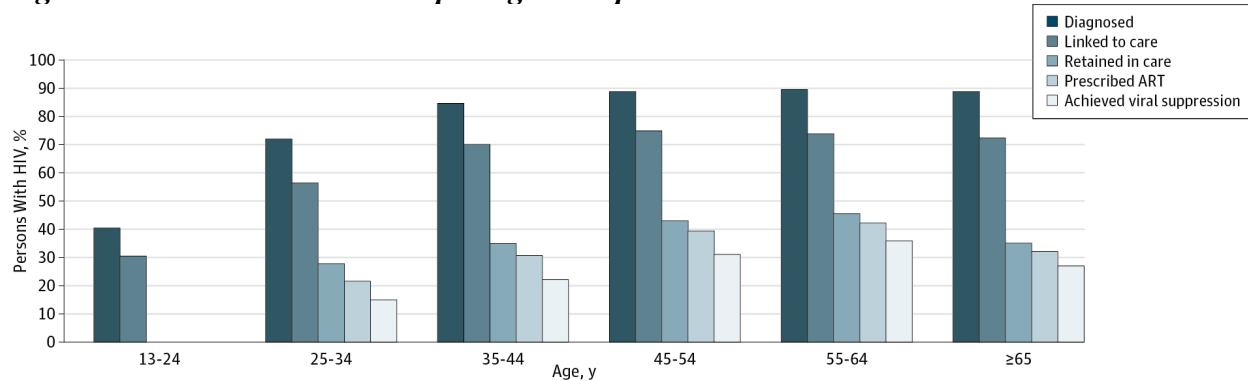
<sup>53</sup> Collins LF, Armstrong WS. What It Means to Age With HIV Infection: Years Gained Are Not Comorbidity Free. *JAMA Netw Open*. 2020;3(6):e208023. doi:10.1001/jamanetworkopen.2020.8023

<sup>54</sup> Collins LF, Armstrong WS. What It Means to Age With HIV Infection: Years Gained Are Not Comorbidity Free. *JAMA Netw Open*. 2020;3(6):e208023. doi:10.1001/jamanetworkopen.2020.8023

<sup>55</sup> CDC Website. <https://www.cdc.gov/hiv/group/age/youth/index.html>

adult services. A study found that only 50% of HIV-infected adolescents transferred to adult-centered care remain in care a year after transition.<sup>56</sup>

**Figure 5: HIV Care Continuum per Age Group<sup>57</sup>**



Given the advances in HIV care and treatment individuals are experiencing advances in longevity as well. As such, quality of life (QOL) has become of increasing importance and enhancements to quality of life have emerged as significant medical outcomes.<sup>58</sup> As a result, several quality of life surveys have been developed specifically targeted towards individuals with HIV, including the Medical Outcomes Study HIV Health Survey (MOS-HIV) - one of the first disease targeted measures available for people living with HIV,<sup>59</sup> the Multidimensional Quality of Life Questionnaire for HIV/AIDS,<sup>60</sup> as well as the WHO Quality of Life-HIV BREF survey.<sup>61</sup>

<sup>56</sup> Patrick Ryscavage, (2016) Linkage to and retention in care following healthcare transition from pediatric to adult HIV care, *AIDS Care*, 28:5, 561-565, DOI: [10.1080/09540121.2015.1131967](https://doi.org/10.1080/09540121.2015.1131967)

<sup>57</sup> Hall HI, Frazier EL, Rhodes P, et al. Differences in Human Immunodeficiency Virus Care and Treatment Among Subpopulations in the United States. *JAMA Intern Med.* 2013;173(14):1337–1344. doi:10.1001/jamainternmed.2013.6841

<sup>58</sup> Basavaraj KH, Navya MA, Rashmi R. Quality of life in HIV/AIDS. *Indian J Sex Transm Dis AIDS.* 2010;31(2):75-80. doi:10.4103/0253-7184.74971

<sup>59</sup> <https://www.jhsph.edu/research/affiliated-programs/medical-outcomes-study-HIV/>

<sup>60</sup> <https://eprovide.mapi-trust.org/instruments/multidimensional-quality-of-life-questionnaire-for-hiv-aids>

<sup>61</sup> [https://www.who.int/mental\\_health/media/en/613.pdf](https://www.who.int/mental_health/media/en/613.pdf)