Longitudinal Housing Instability & Frailty Incidence Among People with HIV

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BACKGROUND

- People with HIV (PWH) disproportionately experience both housing instability and frailty, an aging-related state of functional decline and vulnerability.
- While housing instability and frailty have been observed to commonly co-occur among PWH, it requires careful longitudinal analysis to elucidate whether housing instability is a potential driver of increased frailty.

METHODS

- *Study Design:* Longitudinal analysis.
- *Setting*: Centers for AIDS Research Network of Integrated Clinical Systems (CNICS) cohort of adult PWH engaged in care across the US (6 of 10 sites included), 2019-2025.
- *Participants*: PWH with longitudinal housing and frailty measures, excluding PWH who were frail at baseline.
- *Exposure:* Time-varying housing instability based on self-reported living situation in the past month:
  - "Stable" vs. "Unstable"/"Homeless"/"Don't know"
- *Outcomes*: Frailty captured using a validated self-reported phenotype, defined as having ≥3 of 4 components (fatigue, weight loss, immobility, inactivity) vs. <3 components.
- *Covariates*: Sociodemographic factors, substance use, HIV clinical indicators, and clinical comorbidities.
- *Analysis:* Cox proportional hazards regression.

RESULTS

Table 1. Baseline demographic and clinical characteristics of people with HIV engaged in clinical care across the US by self-reported housing status, 2019-2025 (N=3,902).

	Self-reported housing status, past month	
	Stable (n=3,613, 92.6%)	Not stable (n=289, 7.4%)
Age, mean (SD)	48.1 (12.6)	42.8 (12.2)
Male	3,111 (86.1%)	247 (85.5%)
Race & ethnicity		
Non-Hispanic White	1,621 (44.9%)	81 (28.0%)
Non-Hispanic Black	1,343 (37.2%)	150 (51.9%)
Hispanic/Latine	440 (12.2%)	40 (13.8%)
Other	209 (5.8%)	18 (6.2%)
HIV viral suppression (<200 copies/mL)	3,416 (94.6%)	222 (76.8%)

Data are n (%) or mean (SD).

Housing instability is associated with twice the rate of frailty among US PWH in clinical care

- There were 24,188 frailty status observations among 3,902 PWH, with a total time at risk of 10,794 person-years (mean: 2.8 years per individual).

Figure 1. Kaplan-Meier frailty survival estimates by housing status among PWH, 2019-2025.

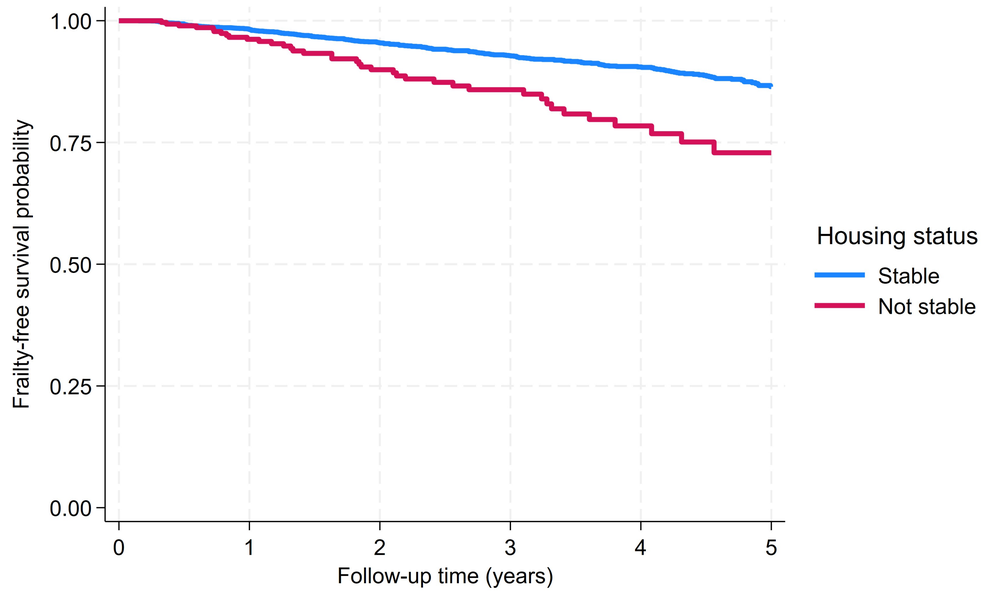


Table 2. Hazard ratio (HR) and 95% confidence interval for the association between housing instability and incident frailty among people with HIV in clinical care, 2019-2025 (N=3,902).

Adjustment set:	Model 1 Socio-demographics[a]	Model 2 Model 1 factors + substance use[b]	Model 3 Model 2 factors + HIV indicators[c]	Model 4: MAIN Model 3 factors + comorbidities[d]
Housing status				
Stable (ref.)	—	—	—	—
Not stable	2.40 (1.70, 3.40)	2.16 (1.51, 3.08)	2.07 (1.44, 2.96)	**2.07** (1.44, 2.97)

Note: No evidence of departure from proportional hazards across models (Schoenfeld residuals p-values all > 0.4). **a)** Adjusted for age, sex, race and ethnicity, site, and year. **b)** Additionally adjusted for time-varying alcohol, nicotine, and illicit drug use. **c)** Additionally adjusted for time-varying HIV viral suppression and CD4 cell count. **d)** Additionally adjusted for time-varying hypertension, diabetes, dyslipidemia, HBV, HCV, FIB-4, and eGFR.

Table 3. Housing instability prevalence across the follow-up period, frailty incidence, and hazard ratios (HR) of frailty associated with housing instability among people with HIV in clinical care across the US, 2019-2025.

Strata	N[a]	Housing instability prevalence, n (%)[b]	Frailty incidence, n (%)[c]	HR (95% CI)[d]
Overall	3,902	435 (11.2%)	297 (7.6%)	2.07 (1.44, 2.97)
Age				
<50 years	2,025	292 (14.4%)	131 (6.5%)	2.28 (1.43, 3.65)
≥50 years	1,877	143 (7.6%)	166 (8.8%)	1.79 (1.00, 3.18)

a) Total persons within row variable strata. **b)** Number and column percentages showing the prevalence of housing instability at baseline or any point over follow-up. **c)** Number and column percentages showing the incidence of frailty during follow-up. **d)** Hazard ratio (HR) of frailty among persons with unstable housing compared to those with stable housing, adjusted for age, sex, race and ethnicity, site, year, and time-varying characteristics including alcohol, nicotine, and illicit drug use; viral suppression and CD4 cell count; and hypertension, diabetes, dyslipidemia, HBV, HCV, FIB-4, and eGFR.

CONCLUSIONS

- Housing instability was associated with incident frailty in this large, longitudinal cohort of adult PWH engaged in clinical care across the US.
- This association persisted across ages in stratified models.
- These findings underscore the importance of assessing and addressing housing instability among PWH of all ages to mitigate accelerated and accentuated aging.

ADDITIONAL KEY INFORMATION

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PLAIN LANGUAGE SUMMARY

Housing instability, including experiencing homelessness or other forms of unstable housing, is associated with a higher rate of frailty across ages among people with HIV engaged in clinical care across the US.