Food insecurity is associated with worse HIV clinical outcomes among women in the United States: Findings from the Women's Interagency HIV Study

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Introduction

- Food insecurity: limited or uncertain availability of nutritionally adequate, foods or inability to acquire food in socially acceptable ways[1]
- Affects half of HIV-infected patients in the U.S[2]
- Disproportionately affects women and women-headed households[3]
- Food insecurity associated with higher HIV viral load and lower CD4 counts in populations comprised mostly of men[2,3]
- Adherence proposed as potential mediator between food insecurity and worse HIV clinical outcomes[3].
- No domestic studies of food insecurity and HIV treatment outcomes specifically among women, none are national[2]

Project Aims

1. Examine association between food insecurity and HIV clinical outcomes in cross-sectional sample from the Women's Interagency HIV Study (WIHS), national sample of HIV-infected women

2. Investigate adherence as potential mediator between food insecurity and HIV clinical outcomes

Methods

- Sample: Cross-sectional study of 1,304 women throughout U.S as part of Women's Interagency HIV Study (WIHS), national longitudinal study of HIV-infected women[4]
- *Primary Independent Variable:* food insecurity measured using the Household Food Security Survey Module, previously validated in several countries including U.S.
- *Primary outcomes:* continuous HIV-viral load and continuous CD4+ count
- *Covariates:* Demographics, socioeconomic controls, clinical controls, substance use
- *Mediator:* Adherence <95% using a visual analog scale
- *Analysis*: For viral load outcome, used Tobit regression analysis, natural log transformed
- For CD4 outcome, used multivariable linear regression.
- Covariates included with bivariate p<0.15.
- For *mediation analysis*, created alternate model including adherence; measured change in coefficient to determine strength of adherence

Results and Outcomes

Table 1: Characteristics of WIHS participants, n=1,304

Characteristic	Value
Age, mean (SD)	48.6 (8.7)
Race/ethnicity: African-American, %	68.7
Hispanic, %	16.4
Other, %	3.4
Less than $500 savings, %	78.2
Having child dependents, %	34.9
Any governmental or non-governmental food aid, %	20.0
Any illicit drug use in last 6 mts, %	23.4
Current alcohol use, %	43.6
Time on ART (years), mean (SD)	9.5 (6.0)
Underweight , BMI<18.5	3.0
Overweight/obese, BMI ≥ 25	72.4
Current non-adherence (<95% of doses), %	17.1
Undetectable viral load, %	58.4
Food insecurity, %	41.9

- **Food insecurity associated with 2.1 times higher HIV-1 viral load (95% CI: 1.1-4.1)**
- Path through adherence accounted for 75.3% of the association between food insecurity and HIV-1 viral load
- **Food insecurity associated with a 43.4 lower mean CD4+ count (-83.1 – -3.6)**
- Adherence accounted for 23.3% of the association

Table 2: Food insecurity associated with increased HIV-1 viral load and decreased CD4+ count

	HIV-1 Viral Load Multivariable Adjusted Factor (95% CI)	CD4+ Cell Count Multivariable Adjusted β (95% CI)
Having food insecurity (marginal, low, or very low food security)	2.1 (1.1-4.1)*	-43.4 (-83.1 – -3.6)*
Age per 10 years	0.7 (0.5-1.1)	-
African-American	2.6 (0.8-8.1)	-26.4 (-90.5 –37.6)
Hispanic white	2.2 (0.6-8.1)	-79.8 (-154.8 – -4.8)*
Other	1.1 (0.6-5.6)	59.4 (-52.7–171.5)
At least high school degree	-	-
Less than $30,000 income	-	-
Less than $500 savings	-	-48.9 (-97.2 – -0.6)*
Having child dependents	2.7 (1.23-5.8)**	-
Homeless/marginal housing	-	-
Any governmental or non-governmental food aid	-	-94.5 (171.4– -17.5)*
Any illicit drug use in last 6 mts[2]	3.2 (1.5-7.0)**	-
Current alcohol use	-	9.8 (-36.0 – -55.6)
CD4 nadir	-	-
Time on ART (years)	1.0 (0.9-1.0)	35.1 (26.3 – 44.0)***
Underweight , BMI<18.5	22.9 (3.9-133.8)**	-128.9 (-242.4 – -15.3)*
Overweight/obese, BMI ≥ 25	-	76.6 (32.3 – 120.7)**

* p<0.05 **p<0.01 ***p<0.001

Discussion

- Prior research demonstrates higher HIV-1 viral loads and lower CD4+ counts associated with worse health outcomes
- First to show adherence as mediator for CD4+ count; prior studies show food security to be highly predictive of ART adherence[5]
- Builds on research that suggests women may prioritize their children's health over their own[6]

Implications

- Further study needed to elucidate the pathways between food insecurity and HIV outcomes
- Assessment of food insecurity could assist programs seeking to bolster ART adherence and improve HIV outcomes
- Comprehensive HIV care that integrates food insecurity interventions may have significant impacts on health of populations living with HIV

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