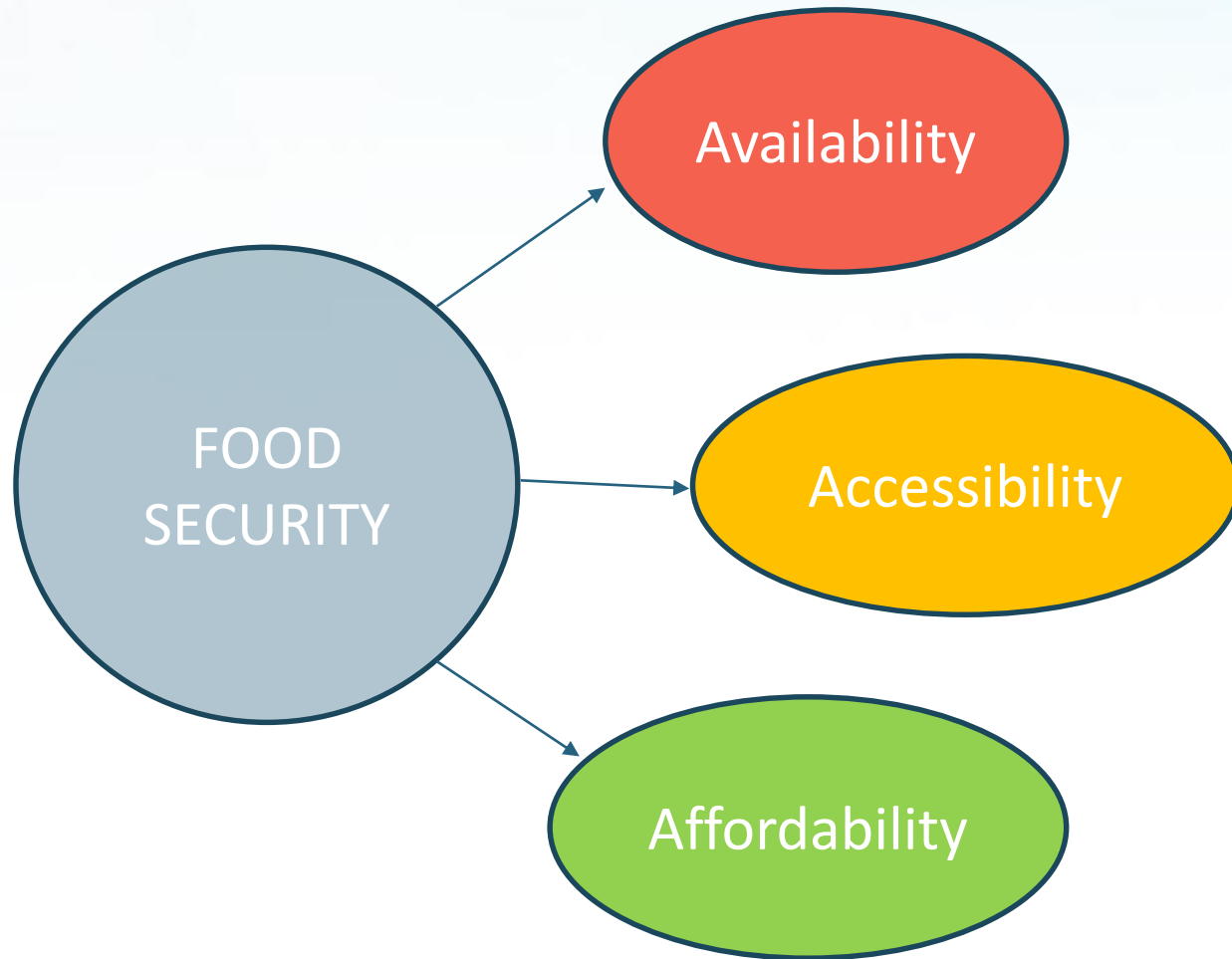


PERSISTENT FOOD INSECURITY IS ASSOCIATED WITH POOR MENTAL HEALTH AMONG WOMEN LIVING WITH OR AT RISK FOR HIV IN THE U.S

Emily Tuthill, Lila Sheira, Kartika Palar, Edward Frongillo, Tracey Wilson, Adebola Adedimeji, Daniel Merenstein, Mardge Cohen, Eryka Wentz, Adaora Adimora, Ighovwerha Ofotokun, Lisa Metsch, Margot Kushel, Janet Turan, Debra Konkle-Parker, Phyllis Tien, Sheri Weiser

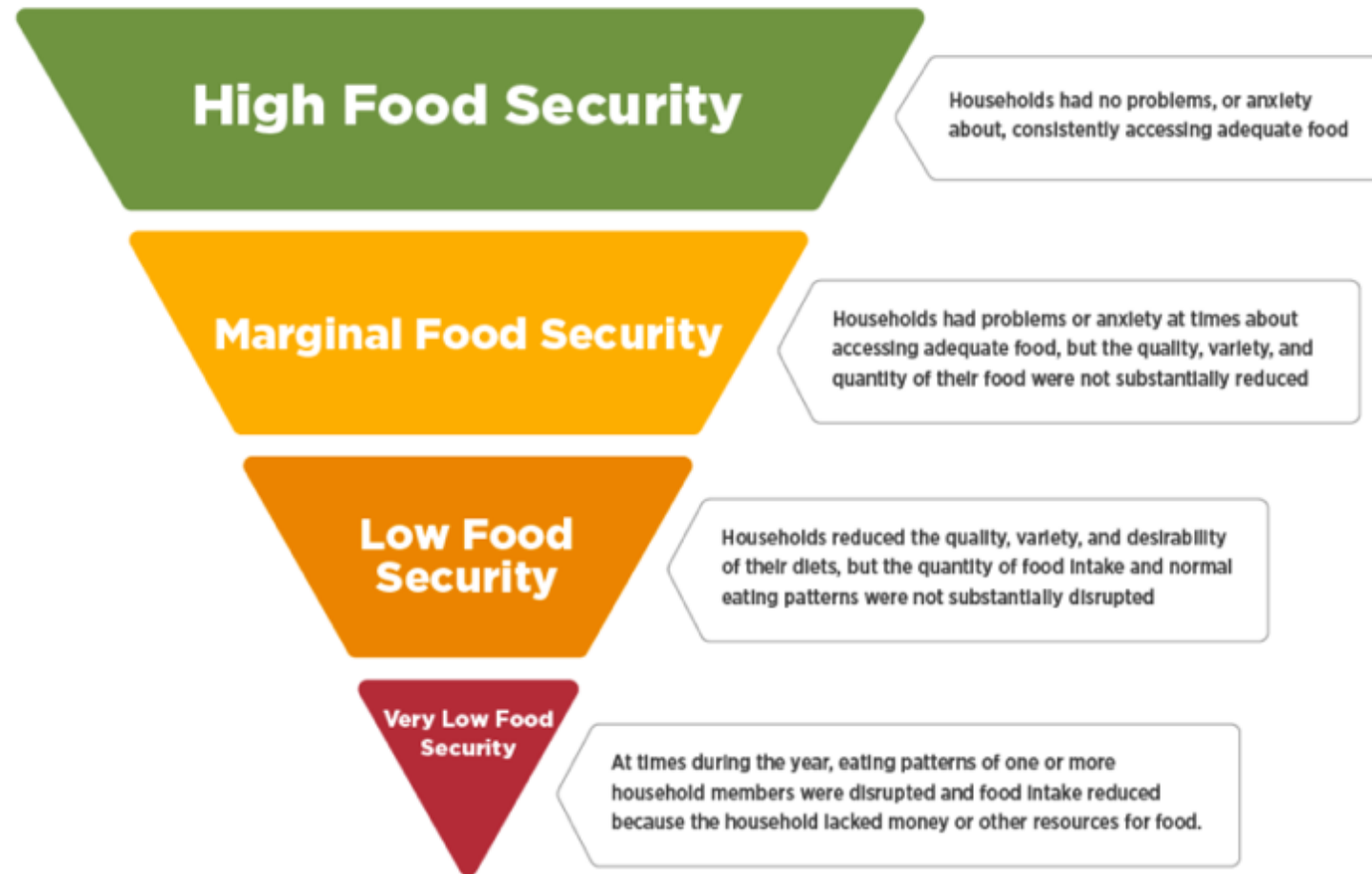


Background: Food Insecurity¹



1. Anema et al., PloS one. 2016

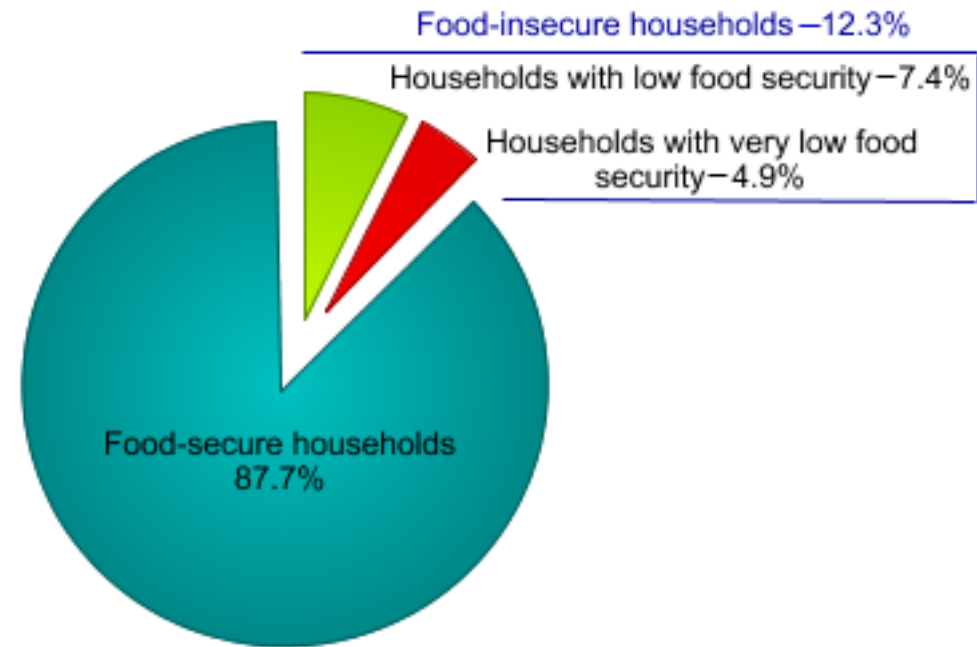
Background: Food Insecurity Defined



Source: Adapted from the USDA Economic Research Service.

Food Insecurity in the U.S

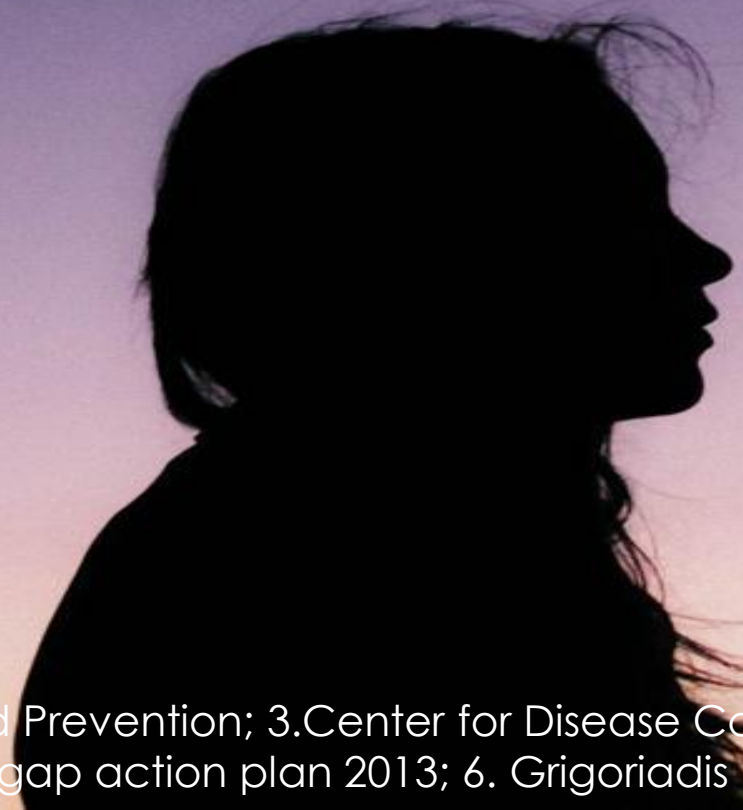
U.S. households by food security status, 2016



Source: USDA, Economic Research Service, using data from the December 2016 Current Population Survey Food Security Supplement.

Background: Depression and Mental Wellbeing

- Women and Depression²⁻⁶:



Background: Depression and Food Insecurity

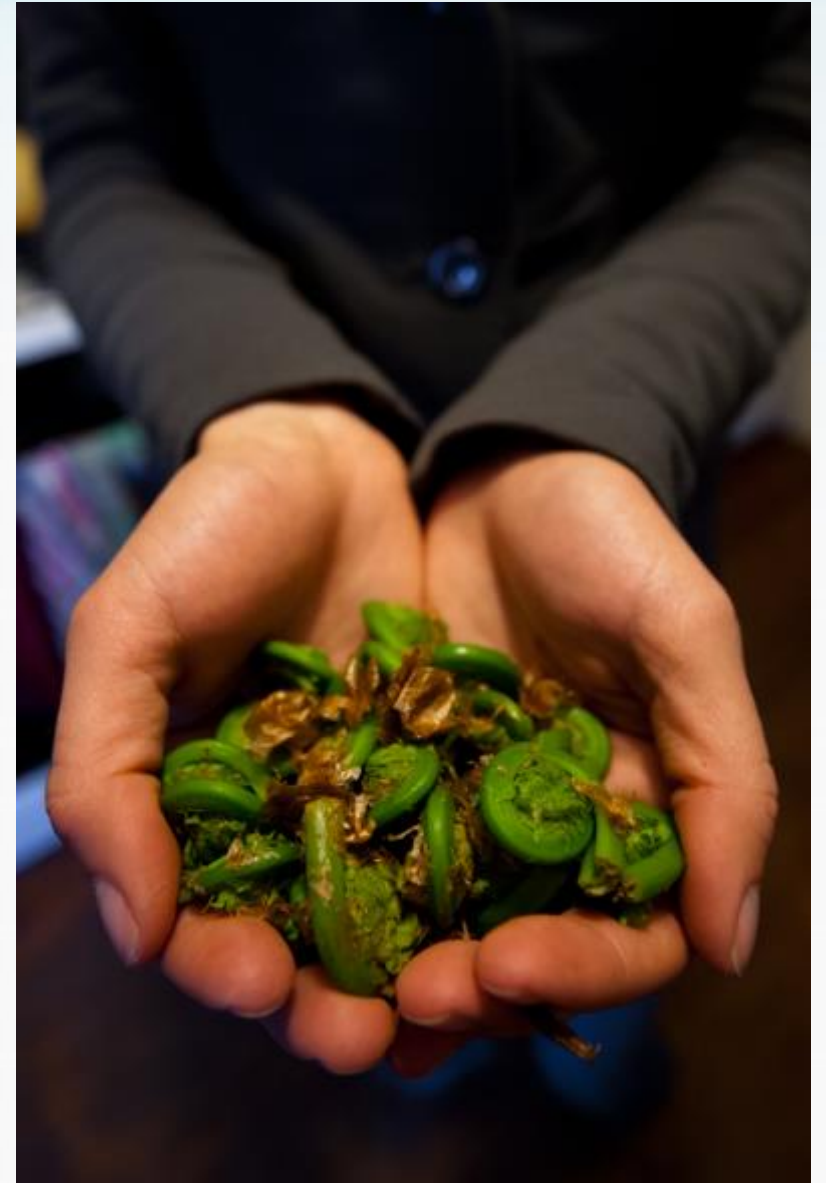
- Food insecurity is associated with depression in cross-sectional studies^{7,8} and one longitudinal study among men living with HIV in the U.S.⁹
- HIV acquisition and treatment adherence are linked to food insecurity and depression^{10,11}



Study Purpose

To understand:

- The relationship between food insecurity and depressive symptoms among U.S women,
- The impact of persistent food insecurity on mental health,
- If the relationship differs between women living with or without HIV.



Study Population: The Women's Interagency HIV Study (WIHS)

- **Design:** Longitudinal data collected every 6 months from April 2013 through March 2016
- **Sample:** 1,801 women living with HIV and 750 HIV-negative individuals.

WIHS Study Sites Across U.S



Methods: Measures

Outcome Variables:

- Depressive symptoms: Center for Epidemiologic Studies Depression (CES-D) scale¹³.
 - Continuous variable->higher scores = worse depressive symptoms (0-60)
- Mental Health: Medical Outcome Study HIV Health Survey (MOS-HIV) mental health summary scale¹⁴.
 - Continuous variable-> higher scores=better mental health (1-100)

Methods: Measures

Independent variable:

- Food insecurity measured by the Household Food Security Survey Module¹⁵
- Scored used standard categorization
- Current (current visit) and lagged variable (6 months previous)

Covariates: Age (per year), Education (<high school vs. higher school or greater), Race/Ethnicity (White, Black AA, Hispanic, other), Income (<12, 12-24, >24), and Recent illicit substance use (excluding marijuana; yes/no)

Methods: Analysis

- Multiple bivariate and adjusted longitudinal linear regression with random effects
- Tested HIV status was an effect modifier.
- To assess for persistent food insecurity we summed the coefficients of current and previous food security
- As a sensitivity analysis, we ran separate models using the reduced CES-D scale that excluded somatic items.

Results: Participant Characteristics

Characteristics	%
Age, years, mean	48
Any food insecurity	44
Race	
Non-Hispanic white	10
Hispanic	15
African American/black	72
Other	4
Annual household income	
≤\$12,000	52
\$12,001-\$24,000	22
≥\$24,001	26
HIV Status	
Negative	29
Positive	71
≥ High school education	67

FOOD INSECURITY AND MENTAL HEALTH

Longitudinal adjusted associations between food insecurity and mental health outcomes, concurrent and concurrent+lagged models

	CESD concurrent model		CESD concurrent + lagged model		Mental health summary score concurrent model		Mental health summary score concurrent + lagged model	
	β	(SE)	β	(SE)	β	(SE)	β	(SE)
Current Food Security (high ref)	0.00		0.00		0.00		0.00	
Marginal FS	2.08***	(0.24)	1.64***	(0.28)	-2.60	(0.54)	-2.71***	(0.82)
Low FS	3.47***	(0.26)	3.25***	(0.30)	-4.81***	(0.58)	-5.16***	(0.90)
Very low FS	5.51***	(0.31)	5.34***	(0.37)	-7.48***	(0.64)	-8.45***	(1.08)
Past food security (high ref)	--	--						
Marginal FS	--	--	-0.177	(0.27)	--	--	-0.390	(0.81)
Low FS	--	--	0.927**	(0.30)	--	--	-2.07*	(0.86)
Very low FS	--	--	1.52***	(0.36)	--	--	-1.84	(1.05)
HIV Status	0.167	(0.332)	0.130	(0.371)	0.642	(0.522)	1.14	(0.705)

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

Models adjusted for age at visit, race/ethnicity, income, education, housing status, child dependents, and drug and alcohol use

Tuthill et. al, unpublished data

PERSISTENT FOOD INSECURITY AND MENTAL HEALTH

Longitudinal adjusted associations between food insecurity and mental health outcomes		
	CESD	Mental health summary score
Persistent Food Insecurity	β (SE)	β (SE)
Marginal FS	1.5*** (0.4)	-3.1** (1.08)
Low FS	4.2*** (0.43)	-7.2*** (1.1)
Very Low FS	6.9*** (0.49)	-10.3*** (1.2)

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

Models adjusted for age at visit, race/ethnicity, income, education, housing status, child dependents, and drug and alcohol use

DISCUSSION



- Food insecurity is associated with worse mental health among women living with or at risk for HIV
- The negative mental health impacts of food insecurity were substantially higher for women experiencing persistent food insecurity.
- HIV status was not an effect modifier of this relationship

STRENGTHS AND LIMITATIONS

- Strengths
 - Large, demographically diverse sample of women living with or at risk for HIV
 - Longitudinal data
- Limitations
 - Generalizability outside WHS cohort
 - Observational
 - Limited age diversity (mean age 48)



IMPLICATIONS

- Women with **persistent** food insecurity had worse mental health outcomes, and should be prioritized for interventions.



- Multi-level, targeted, interventions to improve mental and physical health are warranted.

ACKNOWLEDGEMENTS

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Table 2: Longitudinal bivariate associations between food security and mental health outcomes

Characteristics	CES-D β (SE)	Mental Health Summary Score β (SE)
Current Food Security (high ref)		
Marginal	2.6*** (0.2)	-4.2*** (0.6)
Low	4.3*** (0.3)	-7.62*** (0.6)
Very Low	6.85*** (0.3)	-11.8*** (0.7)
Previous food security (high ref)		
Marginal	0.56* (0.3)	-3.3*** (0.9)
Low	2.1*** (0.3)	-7.5*** (0.9)
Very Low	3.7*** (0.4)	-11.9*** (1.0)
HIV status (neg. ref)	-0.03 (0.4)	0.5 (0.7)
Age at visit (per 10 years)	-0.03 (0.43))	0.16*** (1.0)
High school education or more	-2.4*** (0.4)	3.4*** (0.7)
Race/ethnicity (Non-Hispanic white ref)		
Hispanic	-2.8*** (0.8)	6.5*** (1.5)
Black/African American	-2.1** (0.7)	6.5*** (1.2)
Other	-1.9 (1.2)	4.3* (2.2)
Annual household income (\leq \$12,000 ref)		
\$12,001-\$24,000	-1.1*** (0.2)	2.3*** (0.6)
\geq \$24,001		
Child dependents in house	-0.1 (0.3)	-1.9** (0.5)
Illicit substance use	3.6*** (0.3)	1.6** (0.8)

Standard errors in parentheses

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 3: Longitudinal adjusted associations between food insecurity and mental health outcomes, concurrent and concurrent and lagged models

Current Food Security (high ref)	CESD--concurrent model		CESD-concurrent + lagged model		Mental health summary score--concurrent model		Mental health summary score-concurrent + lagged model	
Marginal FS	2.08***	(0.236)	1.64***	(0.279)	-2.60	(0.537)	-2.71***	(0.822)
Low FS	3.47***	(0.257)	3.25***	(0.303)	-4.81***	(0.577)	-5.16***	(0.900)
Very low FS	5.51***	(0.309)	5.34***	(0.374)	-7.48***	(0.641)	-8.45***	(1.08)
Past food security (high ref)								
Marginal FS	--	--	-0.177	(0.270)	--	--	-0.390	(0.813)
Low FS	--	--	0.927**	(0.298)	--	--	-2.07*	(0.864)
Very low FS	--	--	1.52***	(0.356)	--	--	-1.84	(1.05)
HIV Status (negative ref)	0.167	(0.332)	0.130	(0.371)	0.642	(0.522)	1.14	(0.705)
Age at visit	-0.111***	(0.0165)	-0.0801***	(0.0186)	0.0583*	(0.0264)	0.0291	-0.0365
Race (white ref)								
Hispanic	-0.673	(0.636)	-0.954	(0.721)	1.4897	(0.991)	2.11	(1.36)
African-American/black	-1.16*	(0.527)	-1.54*	(0.600)	3.17***	(0.825)	4.08***	(1.14)
Other	-1.86*	(0.933)	-1.40	(1.06)	2.94*	(1.43)	2.77	(1.95)
Income (<\$12,000 ref)								
\$12,0001-\$24,000	-0.496*	(0.226)	-0.518	(0.265)	0.229	(0.489)	-0.0475	(0.682)
\$24,001-\$36,000	-0.994**	(0.311)	-1.35***	(0.367)	0.516	(0.646)	1.12	(0.908)
\$36,001-\$75,000	-0.833*	(0.363)	-1.00*	(0.426)	1.05	(0.726)	1.99	(1.03)
\$75,001+	-1.48**	(0.557)	-1.33*	(0.652)	1.75	(1.08)	1.44	(1.51)
≥High school education	-1.12***	(0.326)	-1.00**	-0.363	1.10*	(0.508)	0.858	(0.684)
Homeless/marginally housed	2.26**	(0.70)	2.02*	(0.87)	0.569	(1.49)	2.69	(2.42)
Health insured	-0.391	(0.340)	-0.327	(0.421)	-0.873	(.570)	-1.30	(1.11)
Child dependents in house	-0.317	(0.234)	-0.00927	(0.270)	0.146	(0.462)	0.1947	(0.656)
Heavy drinking	1.02***	(0.266)	1.30***	(0.308)	-0.871	(0.570)	-0.737	(0.823)