



INFORMAL CAREGIVING AND OVERALL HEALTH:

Magnification of effects by income and employment status

● ● ● ● ●

Steven A. Cohen, DrPH, MPH
Assistant Professor
Department of Epidemiology and Community Health
Virginia Commonwealth University

American Public Health Association
140th Annual Meeting
October 31, 2012
Session 5160.0, Abstract 270919




PRESENTER DISCLOSURES

Steven A. Cohen

The following personal financial relationships with
commercial interests relevant to this presentation
existed during the past 12 months:

—NO RELATIONSHIPS TO DISCLOSE—



2

WHAT IS INFORMAL CAREGIVING?

- Care provided by family members, friends, and neighbors to adults living with disabilities or chronic disease
 - Commonly to individuals with Alzheimer’s disease or dementia
- Caregivers not formally trained in caregiving
- Usually unpaid
- Care recipient usually living at home
 - Occasionally institutionalized



3

INFORMAL CAREGIVING IN THE US

- Estimated 50 million informal caregivers
 - About 16% of US population
- Saves economy \$200 billion per year¹
 - Surpasses funds spent on formal care²
- Most care provided by relatives (92%)³
- Many are part of the “sandwich generation”
- Benefits to the recipient *and* caregiver



4

CONSEQUENCES OF INFORMAL CAREGIVING

Numerous health effects

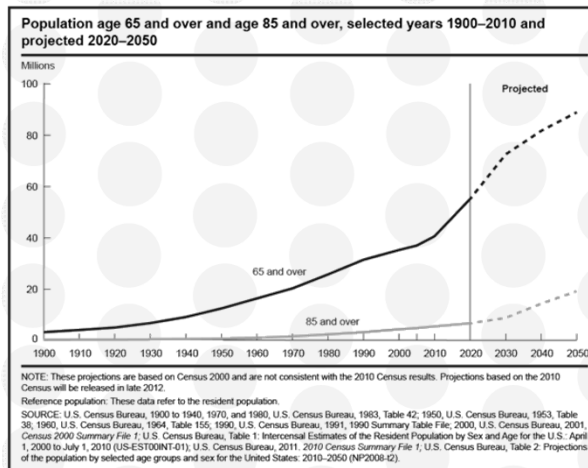
- Employment, strain, leisure time, and overall physical and mental health⁴
- Impact of time and resource reallocation
- Disproportionate burden in females
- Reduction in preventive health behaviors⁵



5

NEED FOR CAREGIVERS WILL INCREASE

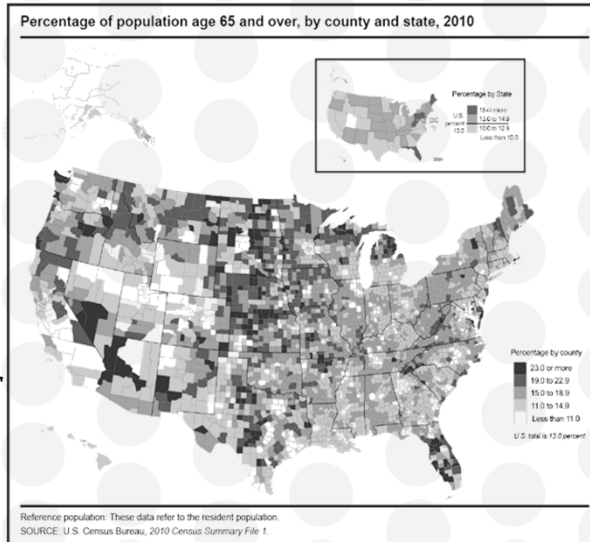
- By 2030, population age 65+ doubles from 34 million to 71 million – 20% of population
- By 2050, the population age 85+ will grow from 5.5 to 19 million



6

GEOGRAPHIC VARIATION

- Associations vary by demographic factors⁶
- Depends on social support and infrastructure^{7,8}
- Distribution of older adults not uniform in the U.S.



7

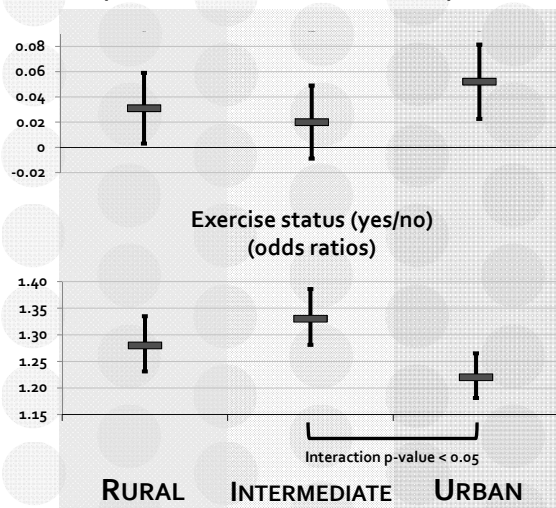
ON THE LAST EPISODE OF APHA...

- Associations between informal caregiving and health are somewhat modified by rurality



ASSOCIATIONS BETWEEN INFORMAL CAREGIVING AND HEALTH

Self-reported health: 1 = excellent... 5 = poor (betas)



8

OBJECTIVE

To determine how the associations of informal caregiving and health vary by income and employment status



9

DATA

- 2009 Behavioral Risk Factor Surveillance System (BRFSS)
 - Annual telephone population survey of 400,000 participants
 - From all 50 states and DC
- Primary exposure: binary indicator of caregiving
- Selected outcomes
 1. Self-reported health status
 2. Exercise (yes/no)
 3. Number of days of poor mental health in previous month
- Stratified separately by income and employment status



10

STATISTICAL METHODS

- Descriptive statistics and frequencies tabulated for all variables
- Bivariate analyses were conducted between the outcome and predictor variables, and among all predictors
- Generalized linear models (GLM) to assess the associations between caregiving and each of the outcome variables.
- GLM:
 - Adjusts for covariates and potential confounders
 - Provides flexibility to use non-normal outcome variables
 - Enables non-independent covariance structure of data
- Effect modification (EM) assessed through:
 - Stratification of the sample by income category and employment status
 - Interaction terms to determine if EM is statistically significant



11

INCOME



12

PREDICTORS OF POOR HEALTH (1)

Poor, Fair, or Good vs. Very Good or Excellent Health

	Model 1	Model 2	Model 3	Model 4
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Caregiver (ref = non-C.G.)	1.025 (1.007, 1.044)	1.013 (0.994, 1.033)	1.048 (1.028, 1.069)	1.107 (1.065, 1.150)
Age (years)		1.028 (1.027, 1.028)	1.020 (1.019, 1.020)	1.020 (1.019, 1.020)
Female		1.024 (1.006, 1.041)	0.870 (0.855, 0.886)	0.870 (0.854, 0.886)
BMI		1.085 (1.083, 1.087)	1.081 (1.080, 1.083)	1.081 (1.080, 1.083)
Race (ref = White)				
Black		1.964 (1.906, 2.024)	1.457 (1.411, 1.504)	1.457 (1.412, 1.504)
Asian		1.384 (1.287, 1.488)	1.605 (1.488, 1.731)	1.605 (1.488, 1.732)
Other		2.283 (2.184, 2.387)	1.604 (1.531, 1.679)	1.601 (1.529, 1.677)
County type (ref = urban)				
Rural			1.110 (1.076, 1.124)	1.110 (1.076, 1.124)
Intermediate			1.025 (1.033, 1.047)	1.024 (1.003, 1.047)
Income cat. (ref = \$75k+)				
< \$20,000			5.210 (5.082, 5.342)	5.377 (5.224, 5.534)
\$20,000 - 34,999			2.400 (2.344, 2.458)	2.443 (2.376, 2.511)
\$35,000 - 74,999			1.527 (1.487, 1.569)	1.538 (1.490, 1.588)
Interactions				
Caregiver X <\$20,000				0.886 (0.839, 0.936)
Caregiver X \$20k - <\$35k				0.938 (0.890, 0.989)
Caregiver X \$35k - <\$75k				0.974 (0.917, 1.034)
AIC	321727	297138	277235	277220

PREDICTORS OF POOR HEALTH (2)

Poor, Fair, Good or Very Good vs. Excellent Health

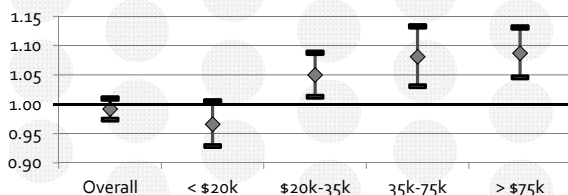
	Model 1	Model 2	Model 3	Model 4
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Caregiver (ref = non-C.G.)	1.074 (1.049, 1.099)	1.045 (1.020, 1.070)	1.056 (1.031, 1.083)	1.065 (1.025, 1.106)
Age (years)		1.023 (1.023, 1.024)	1.018 (1.017, 1.018)	1.018 (1.017, 1.018)
Female		1.061 (1.038, 1.084)	0.972 (0.950, 0.993)	0.971 (0.950, 0.993)
BMI		1.110 (1.108, 1.113)	1.108 (1.106, 1.111)	1.108 (1.106, 1.111)
Race (ref = White)				
Black		1.502 (1.441, 1.566)	1.145 (1.097, 1.196)	1.145 (1.097, 1.196)
Asian		1.161 (1.071, 1.260)	1.320 (1.215, 1.435)	1.320 (1.215, 1.435)
Other		1.592 (1.501, 1.692)	1.166 (1.097, 1.239)	1.165 (1.096, 1.238)
County type (ref = urban)				
Rural			1.112 (1.082, 1.143)	1.112 (1.082, 1.142)
Intermediate			1.066 (1.039, 1.094)	1.066 (1.039, 1.094)
Income cat. (ref = \$75k+)				
< \$20,000			3.769 (3.648, 3.893)	3.841 (3.700, 3.987)
\$20,000 - 34,999			2.138 (2.079, 2.199)	2.137 (2.069, 2.208)
\$35,000 - 74,999			1.551 (1.505, 1.598)	1.543 (1.491, 1.598)
Interactions				
Caregiver X <\$20,000				0.927 (0.863, 0.997)
Caregiver X \$20k - <\$35k				1.002 (0.941, 1.067)
Caregiver X \$35k - <\$75k				1.018 (0.951, 1.091)
AIC	222652	206926	198868	198868

PREDICTORS OF # DAYS IN POOR HEALTH

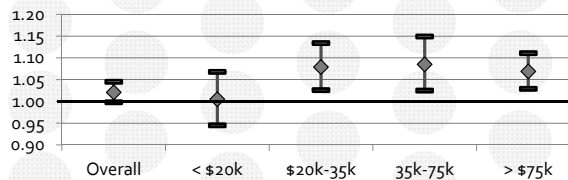
	Model 1	Model 2	Model 3	Model 4
	Relative Risk (95% CI)	Relative Risk (95% CI)	Relative Risk (95% CI)	Relative Risk (95% CI)
Caregiver (ref = non-C.G.)	0.998 (0.988, 1.009)	1.034 (1.024, 1.045)	1.059 (1.048, 1.070)	1.060 (1.039, 1.083)
Age (years)		1.018 (1.018, 1.018)	1.013 (1.013, 1.013)	1.013 (1.013, 1.013)
Female		1.184 (1.173, 1.195)	1.095 (1.084, 1.106)	1.094 (1.084, 1.104)
BMI		1.035 (1.034, 1.036)	1.030 (1.030, 1.031)	1.030 (1.030, 1.031)
Race (ref = White)				
Black		1.158 (1.141, 1.176)	0.922 (0.908, 0.937)	0.922 (0.908, 0.937)
Asian		0.786 (0.754, 0.819)	0.879 (0.842, 0.917)	0.880 (0.843, 0.918)
Other		1.456 (1.423, 1.489)	1.147 (1.120, 1.174)	1.147 (1.120, 1.173)
County type (ref = urban)				
Rural			0.994 (0.983, 1.006)	0.994 (0.983, 1.006)
Intermediate			0.987 (0.976, 0.998)	0.987 (0.976, 0.998)
Income cat. (ref = \$75k+)				
< \$20,000			3.173 (3.133, 3.213)	3.204 (3.157, 3.251)
\$20,000 - 34,999			1.680 (1.659, 1.702)	1.675 (1.650, 1.701)
\$35,000 - 74,999			1.287 (1.268, 1.306)	1.271 (1.249, 1.293)
Interactions				
Caregiver X <\$20,000				0.962 (0.935, 0.989)
Caregiver X \$20k - <\$35k				1.012 (0.984, 1.041)
Caregiver X \$35k - <\$75k				1.046 (1.012, 1.081)
AIC	1243465	1216322	1179081	1179058

INTERPRETING RESULTS- INCOME*

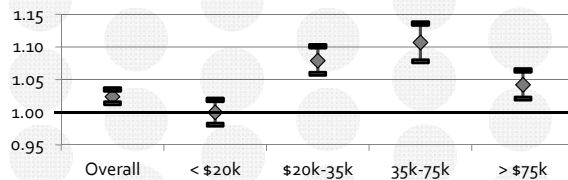
OR CG predicting "poor" - "good" health



OR CG predicting "poor" - "very good" health



RR of CG for # days of poor health



*Adjusting for age, sex, BMI, race, and rurality

EMPLOYMENT

● ● ● ● ●

17

PREDICTORS OF POOR HEALTH (1)

Poor, Fair, or Good vs. Very Good or Excellent Health


	Model 1	Model 2	Model 3	Model 4
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Caregiver (ref = non-C.G.)	1.025 (1.007, 1.044)	0.992 (0.974, 1.010)	1.010 (0.992, 1.029)	0.900 (0.874, 0.925)
Age (years)		1.027 (1.027, 1.028)	1.015 (1.015, 1.016)	1.015 (1.015, 1.016)
Female		1.032 (1.016, 1.049)	1.005 (0.988, 1.022)	1.004 (0.987, 1.021)
BMI		1.082 (1.080, 1.084)	1.083 (1.082, 1.085)	1.084 (1.082, 1.086)
Race (ref = White)				
Black		2.087 (2.027, 2.147)	1.913 (1.858, 1.970)	1.911 (1.856, 1.968)
Asian		1.461 (1.364, 1.566)	1.489 (1.389, 1.596)	1.484 (1.384, 1.591)
Other		2.270 (2.176, 2.367)	2.109 (2.022, 2.200)	2.109 (2.021, 2.200)
County type (ref = urban)				
Rural		1.338 (1.312, 1.364)	1.314 (1.288, 1.340)	1.313 (1.287, 1.339)
Intermediate		1.115 (1.093, 1.137)	1.099 (1.078, 1.121)	1.100 (1.078, 1.121)
Employment (ref = not emp)				
Employed for wages			0.429 (0.421, 0.437)	0.618 (0.577, 0.662)
Homemaker			0.679 (0.657, 0.702)	0.821 (0.721, 0.934)
Interactions				
Caregiver X Emp for wages				0.809 (0.779, 0.841)
Caregiver X Homemaker				0.897 (0.835, 0.964)

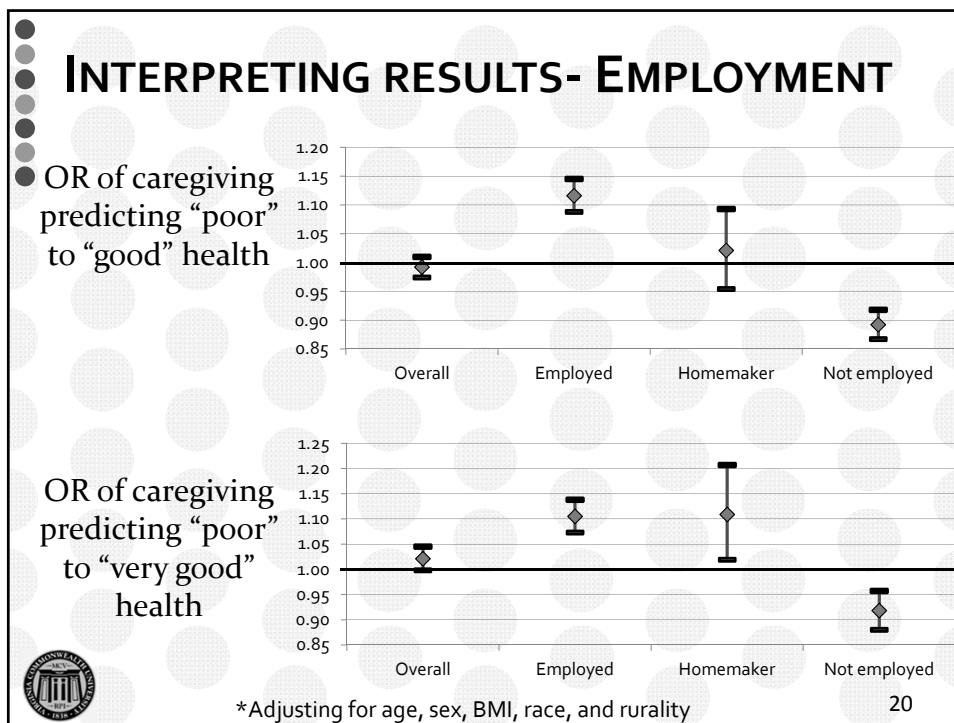
18

PREDICTORS OF POOR HEALTH (2)

Poor, Fair, Good or Very Good vs. Excellent Health

	Model 1	Model 2	Model 3	Model 4
	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)	Odds Ratio (95% CI)
Caregiver (<i>ref = non-C.G.</i>)	1.025 (1.007, 1.044)	1.021 (0.998, 1.045)	1.035 (1.011, 1.059)	0.913 (0.875, 0.951)
Age (years)		1.023 (1.023, 1.024)	1.015 (1.014, 1.016)	1.015 (1.014, 1.016)
Female		1.069 (1.047, 1.092)	1.060 (1.038, 1.083)	1.060 (1.037, 1.082)
BMI		1.107 (1.104, 1.110)	1.110 (1.107, 1.113)	1.110 (1.107, 1.112)
<i>Race (ref = White)</i>				
Black		1.585 (1.523, 1.650)	1.456 (1.398, 1.515)	1.453 (1.396, 1.513)
Asian		1.233 (1.141, 1.333)	1.245 (1.151, 1.346)	1.246 (1.152, 1.348)
Other		1.594 (1.506, 1.686)	1.490 (1.408, 1.577)	1.489 (1.407, 1.576)
<i>County type (ref = urban)</i>				
Rural		1.320 (1.288, 1.353)	1.297 (1.265, 1.329)	1.294 (1.262, 1.327)
Intermediate		1.136 (1.109, 1.164)	1.123 (1.096, 1.150)	1.122 (1.095, 1.149)
<i>Employment (ref = not emp)</i>				
Employed for wages			0.514 (0.502, 0.527)	0.701 (0.639, 0.768)
Homemaker			0.665 (0.637, 0.693)	0.937 (0.793, 1.108)
<i>Interactions</i>				
Caregiver X Emp for wages				0.837 (0.796, 0.881)
Caregiver X Homemaker				0.821 (0.748, 0.901)


19



INCOME AND EMPLOYMENT TOGETHER

- Examining two-way interactions of caregiving and self-reported health by income and employment status simultaneously

Odds ratios of caregiving predicting “poor” to “good” health*

	Employed for wages	Homemaker	Not employed
< \$20,000	1.098 (1.026, 1.175)	0.917 (0.793, 1.059)	0.928 (0.882, 0.976)
\$20,000 - 34,999	1.128 (1.073, 1.187)	1.120 (0.974, 1.288)	0.967 (0.915, 1.021)
\$35,000 - 74,999	1.111 (1.047, 1.179)	1.104 (0.906, 1.344)	1.027 (0.943, 1.118)
\$75,000 +	1.123 (1.071, 1.176)	1.243 (1.070, 1.445)	0.963 (0.885, 1.048)



*Adjusting for age, sex, BMI, race, and rurality

21

INCOME AND EMPLOYMENT TOGETHER

- Examining two-way interactions of caregiving and self-reported health by income and employment status simultaneously

Odds ratios of caregiving predicting “poor” to “very good” health*

Income	Employed for wages	Homemaker	Not employed
< \$20,000	1.140 (1.033, 1.260)	1.029 (0.822, 1.288)	0.934 (0.859, 1.105)
\$20,000 - 34,999	1.145 (1.072, 1.223)	1.121 (0.926, 1.356)	0.996 (0.916, 1.084)
\$35,000 - 74,999	1.103 (1.030, 1.182)	1.153 (0.912, 1.458)	1.042 (0.929, 1.168)
\$75,000 +	1.090 (1.042, 1.140)	1.200 (1.041, 1.382)	0.961 (0.875, 1.056)



*Adjusting for age, sex, BMI, race, and rurality

22

SUMMARY AND IMPLICATIONS

- Relationship between caregiving and health depends upon key socioeconomic and demographic factors
 - Reconsider one-size-fits-all interventions designed to reduce caregiver burden
- Strongest positive associations observed in
 - Higher-income, employed subgroups
 - Higher-income, homemaker subgroup
- Caregiving associated with better health in lower-income and unemployed groups
 - Sense of purpose?
 - Selection of healthy caregivers in sample?



23

FUTURE DIRECTIONS AND LIMITATIONS

Limitations

- Large sample → significant associations less clinically meaningful
- Little detail on **caregiving intensity**
- Income category cutoffs
- Caregiving relationship
 - Spousal, child-parent, sibling, and other

Future research

- Other health-related outcomes
- Multi-level modeling of income on IC and health
- New data set- National Survey of Caregiving (from NHATS)
 - Details multiple caregivers
 - 100+ questions on caregiving activities



24

REFERENCES

1. Arno PS, Levine C, Memmott MM. *Health Aff (Millwood)*. 1999 Mar-Apr;18(2):182-8.
2. Harrow BS, Mahoney DF, Mendelsohn AB, Ory MG, Coon DW, Belle SH, Nichols LO. *Am J Alzheimers Dis Other Demen*. 2004 Sep-Oct; 19(5):299-308.
3. Gibson MJ, Houser A. Issue Brief (Public Policy Inst (Am Assoc Retired Pers)). 2007 Jun;(IB82):1-12.
4. Ory MG, Hoffman RR, Yee JL, Tennstedt S, Schulz R. *Gerontologist*. 1999 Apr; 39(2):177-85.
5. McGuire L, Bouldin EL, Andresen EM, Anderson LA. *J Nutr Health Aging*. 2010 May;14(5): 373-9.
6. Glasgow N. *J Fam Iss*. 2000 Jul; 21(5):611-31.
7. Bédard M, Koivuranta A, Stuckey A. *Can J Rural Med*. 2004; 9(1):15-23.
8. Navaie-Waliser M, Feldman PH, Gould DA, Levine C, Kuerbis AN, Donelan K. *Am J Public Health*. 2002 Mar;92(3):409-13.



25

Contact info:

Steven A. Cohen, DrPH, MPH
 Assistant Professor
 Department of Epidemiology
 & Community Health
 Virginia Commonwealth
 University, Richmond, VA
scohen@vcu.edu
 804.628.4043

THANK YOU!
 Questions?