

# Nonmarket Indirect Costs of Being Overweight and Obese Among Women

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# Background:

- Obesity: widely recognized healthcare problem
- Overweight and Obesity Rates in the United States:
  - 1960-1962: 44.8% of adults
  - 1988-1994: 56% of adults
  - 2009-2012: 68.8% of adults
- Substantial economic costs:
  - Both direct and indirect.

# Indirect Costs

- Primarily based on self-reported absenteeism measures, and thus may not be truly reflective of actual costs.
  - Estimated that the cost of absenteeism for the United States range anywhere from \$3.38 and \$6.38 billion dollars annually and premature mortality in the United States amounts to \$30 billion.

# Gaps in the Literature

- Do not take costs such as lost productivity at home and occupational costs into account.
- As mothers, in general, are the vortex of family decisions in terms of eating and other behaviors:
  - Analyzing how obesity affects household production should be included in the literature as it not only has indirect costs associated with it, but there are numerous spill-over effects.

# Nonmarket and Market Costs of Overweight/Obesity

- Goal: indirect costs with respect to nonmarket and market activities.
  - Are there household productivity differences between BMI strata?

# Theoretical Model

- Defining housework:
  - The production of goods and services for own-consumption that could have been produced by hiring a third party to produce them had household members not done so (Reid, 1934).
- Household Production Model
  - Households combine time and market goods via a production function to produce basic commodities where households allocate their time and money to maximize their utility, given a specific utility function and set of budget constraints.

# Theoretical Model

- Household maximizes utility subject to:
  - resource, legal, technical, and socio-cultural constraints on behavior.
- Household production function:  $G = g(H; X)$ 
  - H: hours of household labor are used per day
  - X: amount of other inputs available
  - G: quantity of household goods produced per day

# Theoretical Model

- John Cawley's "SLOTH" model
  - Individuals maximize their utility subject to: time, budget, and biology.

$U(S, L, O, T, H, W(S, L, O, T, H, F), h(S, L, O, T, H, F, W), Y)$

- The focus of this analysis is on the household production function  $[H(T_H, X_H; BMI, D)]$ 
  - Generates the derived demand equation for housework time where BMI is posited to be predetermined.



# Methodology

- Data: American Time-Use Survey (2006-2008); Eating and Health Module
  - The EH Module contains time-use questions on a range of eating and health topics such as time spent in eating and drinking activities, grocery shopping, and meal preparation and other self-rated health status questions.
- Restrictions:
  - Female respondents
  - Between the ages of 25 and 64
  - BMI ranges from 18.5 to 64
  - Final sample size is 13,323 individuals.

# Household Productivity Differences

- Two hypotheses:

$$\frac{\partial(\text{housework})}{\partial(\text{BMI})} < 0$$

$$\frac{\partial(\text{housework})}{\partial(\text{BMI})} > 0$$

# Weighted Descriptive Statistics

Variable	Definition	Mean/Proportion (n = 13,323)
<b>NORMAL WEIGHT</b>	BMI between 18.5 and 24.9	0.42
<b>OVERWEIGHT</b>	BMI between 25 and 29.9	0.30
<b>OBESE</b>	BMI greater or equal to 30	0.28
<b>BMI</b>	weight (kg) / [height (m)] <sup>2</sup>	27.45
<b>AGE</b>	1 = less than or equal to 45 0 = greater than 45	0.53
<b>SCHOOLING</b>	1 = more than high school level education 0 = high school degree or less	0.61
<b>MARRIED</b>	1 = married 0 = never married, widowed, or divorced	0.64
<b>CHILDREN</b>	Average number of children in the household	0.91
<b>YOUNG CHILDREN</b>	Children between the ages of 1 and 2	0.07
<b>HEALTH</b>	1 = excellent, very good, and good health 0 = fair and poor health	0.85

<b>EMPLOYED</b>	<b>1 = in labor force</b> <b>0 = not in labor force</b>	<b>0.75</b>
<b>DAY OF WEEK</b>	1 = weekday	0.71
<b>POVERTY</b>	1 = household income greater than 185% of poverty threshold	0.72
<b>HOUSE TYPE</b>	1 = house, apartment, or flat 0 = other types of housing	0.95
<b>HOLIDAY</b>	1 = interview day was a holiday	0.02
<b>RACE</b>	1 = White 0 = non-White	0.81
<b>TENURE</b>	1 = owned or rented for cash 0 = occupied without payment	0.99
<b>REGION</b>	1 = South 0 = Northeast, Midwest, or West	0.36
<b>FOOD STAMP</b>	1 = does not receive food stamps	0.92
<b>YEAR</b>	1 = survey year is 2006 0 = survey year is 2007 or 2008	0.33

# Regression Analysis

- Two-stage least squares (2SLS)
  - Endogeneity: using BMI as a right side
    - the possibility of reverse causality arising: increased BMI lead to spending less time in housework or less time in housework leads to increased BMI
- Instruments:
  - Area based measure: ‘region’
  - Year of diary day
  - Food stamp participation

Variable	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	96.80**	6.25	15.48	<.0001
OVERWEIGHT	-6.37*	3.40	-1.88	0.0607
OBESE	-15.23**	3.54	-4.29	<.0001
AGE_CAT	0.395	3.31	0.12	0.9049
DAY_CAT	-19.68**	3.10	-6.35	<.0001
EMPSTAT_CAT	-91.28**	3.45	26.43	<.0001
EDUC_CAT_D	-7.45**	3.03	-2.45	0.0141
MARST_CAT_D	42.82**	3.20	13.37	<.0001
GENHEALTH_CAT	16.28**	4.30	3.79	0.0002
HH_NUMKIDS	44.96**	1.41	31.71	<.0001
HOLIDAY	21.11*	10.81	1.95	0.051
RACE_CAT	15.51**	3.23	4.8	<.0001
TENURE_CAT	74.64**	5.80	12.87	<.0001
KID1TO2	5.70	3.65	1.56	0.1189
R-square	0.209	F Value	271.33	
Adjusted R-square	0.208			

# Regression Results

- In comparison to normal weight women:
  - Overweight women spend 6.37 minutes less on housework time per day.
  - Obese women spend 15.23 minutes less on housework per day.

# Regression Results

- Housework differences per year (excluding travel time):
  - Overweight women: 38 hours less
  - Obese women: 88 hours less
- Housework differences per year (including travel time):
  - Overweight women: 39 hours less
  - Obese women: 93 hours less



# Conclusions

- Costs per year (in terms of median hourly wage for housekeeper):
  - Overweight women: \$354
  - Obese women: \$846
- Thus, the per person annual amount would translate to the following annual costs:
  - Over \$10 billion for overweight women and over \$32 billion for obese women.

\*In 2008 dollars

# Conclusions

- Being overweight or obese significantly reduces time spent in housework activities, in comparison to their normal-weight counterparts.
  - Results indicate that overall economic costs of obesity, as described in the literature, are conservative estimates for they do not take these additional indirect costs into account.
- Race/ethnicity is statistically significant.
  - **Non-Hispanic White: spending approximately 16 minutes more on housework per day than being non-White.**