

Obesity and Social Inequality in America

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Abstract

- **Method:** Ordinary Least Squares Regression (OLS)
- **Data:** Centers for Disease Control and Prevention (CDC) and the U.S. Census
- **Purpose:** to examine the factors that influence state level obesity rates in the United States.
- **Results:**
 - Significant variables:
 - SNAP Benefits
 - Leisure time physical activity (LTPA)
 - Percentage of African Americans
 - Healthy food available within a half-mile

Literature Review

- Race

- Individuals who live in communities with a high concentration of African-Americans (AA) are more likely to be obese than those living in other communities (Kirby, et al, 2012)

- Why?

- Overweight AA may have a higher health-related quality of life than normal-weight and obese AA.

- Premise that underweight
= poor health



- Greater competing mortality risks
- BMI Measurement Issues: Higher lean mass and lower fat mass (Bentley, et al, 2011)
- Neighborhood Disadvantage (Nicholson and Browning, 2011)

Literature Review

- Socioeconomics
 - Living in communities with higher socioeconomic disadvantage is associated with higher BMI regardless of age, race, individual socioeconomic status, physical activity variables, and social support (Robert and Reither, 2004).
 - Why?
 - Poor residents have 2.5 times the exposure to fast food outlets vs people in the wealthiest areas (Reidpath et al. (2002)
 - Businesses, including grocery stores, perceive the personal and economic risks of operating in low-income communities as higher and therefore charge higher prices to compensate for it (Cummins & Macintyre, 2006)

Literature Review

- Food Environment
 - Shoppers at high-price supermarkets had obesity rates that were 1/3 of shoppers at low-priced supermarkets. Consumption determined by price, not proximity (Drewnowski, et al, 2012).
- Technological Change
 - Calorie consumption has not significantly increased; so physical activity must have decreased to cause an increase in the prevalence of obesity.
 - Today:
 - Most work requires little exercise
 - Food stamps for those who do not work
 - Income gains associated with technological progress vs. increasing demand for thinness as income rises (Phillipson, 2001).



Hypothesis

Obesity rates are determined by:

1. Supplemental Nutrition Assistance Program (SNAP) benefits per person
2. the percentage of residents with no leisure-time physical activity (LTPA)
3. median household income
4. percentage of African American residents
5. availability of healthy food options within a half-mile
6. Modified Retail Food Environment Index (mRFEI).

Methodology

Using previous models as a guide, the following equation is estimated in the present study:

$$O = \beta_0 + \beta_1 S + \beta_2 L + \beta_3 I + \beta_4 A + \beta_5 H + \beta_6 M + \varepsilon$$

where:

- O = State level obesity rate, percentage of adults who have a BMI of 30 or higher
- S = Supplemental Nutrition Assistance Program (SNAP) benefits per person
- L = Percentage of residents with no leisure-time physical activity (LTPA)
- I = Median household income
- A = Percentage of African American residents
- H = Percentage of census tracts that do not have at least one healthy food retailer located within the tract or within a 1/2 mile of the census tract boundary
- M = Modified Retail Food Environment Index (mRFEI)

Highest and Lowest Obesity Rates

Table 1. States with the Highest and Lowest Obesity Rates

5 States with Highest Obesity Rates									
State	Obesity Rate	Obesity Score	SNAP Benefit Per Person	LTPA	Median Household Income	Percent African American	Half-Mile	mRFEI	
Mississippi	35%	3	\$123	31%	\$41,090	38%	67%	8	
Louisiana	33%	3	\$131	31%	\$40,658	33%	71%	9	
West Virginia	32%	3	\$120	25%	\$41,821	4%	70%	13	
Alabama	32%	3	\$135	29%	\$42,590	27%	67%	10	
Michigan	31%	3	\$136	23%	\$48,879	15%	67%	10	
5 States with Lowest Obesity Rates									
State	Obesity Rate	Obesity Score	SNAP Benefit Per Person	LTPA	Median Household Income	Percent African American	Half-Mile	mRFEI	
California	24%	1	\$147	23%	\$53,367	7%	84%	11	
New Jersey	24%	1	\$133	27%	\$62,338	15%	78%	8	
Massachusetts	23%	1	\$132	21%	\$63,313	9%	71%	7	
Hawaii	22%	1	\$215	19%	\$59,047	3%	81%	14	
Colorado	21%	1	\$140	18%	\$58,629	5%	70%	11	
National Average									
United States	Obesity Rate	Obesity Score	SNAP Benefit Per Capita	LTPA	Median Household Income	Percent African American	Half-Mile	mRFEI	
National Average	28%	2.02	\$132	23%	\$50,595	11%	69%	10	

Obesity in the United States



1/3 Normal



1/3 Overweight



1/3 Obese

Results

Table 2. Ordinary Least Squares Regression Results

Variable	Coefficient	Test Statistic	Beta
SNAP Benefits	-0.05119	-2.55 **	-0.340
LTPA	0.23507	2.04 **	0.301
Median Household Income	-0.00007	-1.36	-0.174
Percent African American	14.51146	3.94 ***	0.458
Half-Mile	-18.11033	-3.67 ***	-0.403
mRFEI	0.18775	1.20	0.146
Constant	38.41718	6.89 ***	

R-squared = 0.687

Adjusted R-squared = 0.616

n = 50

Significant at 10% level = *

Significant at 5% level = **

Significant at 1% level = ***

Results

- Variables that increase obesity:
 - No leisure-time physical activity



- Percent African American



- Variables that decrease obesity:
 - SNAP Benefits
 - Healthy food within a half-mile



County Level Study Variables

Table 1 Explanation of variables

Variable	Name	Definition
Obesity	OBES	% of the adult population age 20 ≤ that has a body mass index (BMI) ≤ to 30 kg/m ²
<i>Location</i>		
Southern Region Counties	SRCD	Counties in 17 southern states defined by the U.S. Census Bureau
Mississippi Counties	MSCD	82 counties in the State of Mississippi
<i>Demographic</i>		
African American	AFAM	% Non-Hispanic African American
Female	FEMF	% Females
Rural	RURL	% Rural
Single-Parent Households	SPHO	% of children living in family households who are raised by a single parent
<i>Social & Economic</i>		
Median Household Income	MEHI	Income level earned by a given household where half of the homes in the county earn more and half earn less
Some College Education	SCED	% of population age 25-44 with some post-secondary education
Unemployment	UNEM	% of population age 16 ≤ unemployed but seeking work
<i>Health</i>		
Limited Access to Healthy Food	LAHF	Low-income areas that are more than a mile from a supermarket
Access to Exercise Opportunity	ATEO	% of the population who live reasonably close to locations for physical activity, including parks or recreational facilities
<i>County Safety</i>		
Violent Crime Rate	VCRR	Rate of violent crime per 100,000 population

Descriptive Statistics

Table 2 Descriptive Statistics

Variable	N	Mean	Std. Dev.	Min.	Max.
OBES	2,565	30.6	4.24	13	48
<i>Location</i>					
SRCD	2,565	0.44	0.49	0	1
MSCD	2,565	0.02	0.15	0	1
<i>Demographic</i>					
AFAM	2,565	8.8	14.39	0	85.2
FEML	2,565	49.99	2.23	28.6	56.6
RURL	2,565	58.62	31.50	0	100
SPHO	2,565	31.6	10.31	0	79
<i>Social & Economic</i>					
MEHI	2,565	44,828.85	11394.18	22,126	121,250
SCED	2,565	55.14	11.80	2.6	100
UNEM	2,565	7.71	2.77	0.8	28.3
<i>Health</i>					
LAHF	2,565	8.36	8.21	0	72
ATEO	2,565	52.24	24.51	0	100
<i>County Safety</i>					
VCRR	2,565	257.13	207.48	0	1990

Statistical Results

Table 3 Regression of explanatory variables on county obesity rates

Variable	Coefficient	Test statistic	Beta
<i>Location</i>			
SBCD	0.508	3.02 ***	0.060
MSCD	1.856	3.59 ***	0.059
<i>Demographic</i>			
AFAM	0.091	16.21 ***	0.310
FEMF	0.093	3.10 ***	0.047
RURL	0.023	9.62 ***	0.170
SPHO	0.030	3.02 ***	0.067
<i>Social & Economic</i>			
MEHI	-0.118	-17.49 ***	-0.324
SCED	-0.110	-4.32 ***	-0.0899
UNEM	0.196	6.97 ***	0.125
<i>Health</i>			
LAHF	0.037	4.39 ***	-0.068
ATEO	-0.007	-2.45 **	-0.042
<i>County Safety</i>			
VCRR	-0.001	-1.51	-0.027
Constant	29.785	16.1	

R-Squared = .495

Adjusted R-squared = .492

n = 2,565

Significant at 10% level = *

Significant at 5% level = **

Significant at 1% level = ***

Conclusion

- This research provides empirical evidence linking the pervasiveness of obesity to the percentage of African American residents, education, physical activity and the availability of healthy food options.
- To the extent that African American residents may have a lower socioeconomic status than non-African Americans, the race variable may serve as a proxy for socioeconomic status.
- With healthcare as the platform for most political campaigns in addition to the War on Poverty it is important that society is aware of the impact that socioeconomic factors have on obesity.

Questions