

Obesity and Social Inequality in America

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Published online: 17 October 2014
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Abstract In the United States food has become a weapon for social control. Hunger and conversely obesity have contributed to the subjugation of underserved populations and served to perpetuate social inequality. This research provides an analysis of the literature on factors that influence obesity rates, however the question of why these factors play a significant role probes deeper into the political and social structures that lend themselves to such inequities. Obesity rates have historically been higher in Southern states, leading to a consideration of historical food preparation and consumption practices and the inter-generational transmission of food culture. This study uses ordinary least squares regression and data from the Centers for Disease Control, and Prevention (CDC), the United State Department of Agriculture (USDA) and the U.S. Census to examine the factors that influence state level obesity rates. The results indicate a significant positive correlation between Supplemental Nutritional Assistance Program (SNAP) assistance and the obesity rate. Lack of physical activity and the percentage of African American residents are also significantly correlated with the level of obesity. In contrast healthy food outlets within a half-mile of the residence appear to be associated with lower levels of obesity.

Keywords Obesity · Race · Physical activity

Introduction

According to the Centers for Disease Control and Prevention (CDC), an adult who has a body mass index (BMI) between 25 and 29.9 is considered overweight.¹ An adult

¹Body Mass Index (BMI) is a number calculated from a person's weight and height. It provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems.

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who has a BMI higher than 30 is considered obese (CDC). The prevalence of overweight/obesity in the United States is high, as evidenced by the nation's average BMI of 27.6 %. This is unsettling, given that obesity has been linked to many chronic diseases, including type 2 Diabetes, hypertension, and several types of cancer (endometrial, postmenopausal breast, kidney, and colon cancer).

A large body of research suggests that obesity rates are influenced by race, gender, and socioeconomic variables. Thirty-nine states have an obesity rate that is considered overweight or obese. The highest rates of obesity in the United States are found among groups of people with a lower socioeconomic status. This is evidenced by the fact that Mississippi is the state with the highest percentage of African American residents, 37.5 %; the highest obesity rate; and the fifth lowest median household income, \$41,090. The state spends \$1.58 billion annually on obesity-attributable medical costs or approximately \$537 per person.

The capitalist market influences of the obesity epidemic have become so influential that obesity can be seen as a sign of market success – fast food restaurant franchises are becoming more prevalent, consumers are buying more food, and obesity rates are increasing. It is unlikely that this trend will change sufficiently without intervening government policies. When the free market creates substantial population detriments and health inequalities, government policies, particularly at the state level are needed to change the ground rules in favor of the population (Swinburn, 2008). A concerted effort from the federal and state governments will be necessary to fight the obesity epidemic. Areas for action should include the following major areas: develop and implement policies to create healthier food and activity environments, increase funding to reduce obesogenic environmental factors and promote healthy eating and increased physical activity (Swinburn, 2008).

Literature review

Physical activity and obesity

Physical inactivity is a contributing factor to obesity. Both are associated with several chronic conditions, higher medical care costs, and premature death (Dwyer-Lindgren, et al. (2013). Philipson (2001) provides a technological change explanation of physical inactivity and increased obesity. Indeed, if calorie consumption has not significantly increased; then physical activity must have decreased to cause an increase in the prevalence of obesity. Today, most professions require little exercise and people who do not work are able to purchase food with food stamps. The income gains associated with technological progress, may, however make the rise in obesity self-limiting when the sedentary effects of such technological progress are dominated by the effect of an increasing demand for thinness as income rises (Philipson 2001).

Socioeconomic factors and obesity

Poverty was once associated with a decrease in food consumption, as sufficient amounts of food were not affordable for many who lived at or below the poverty line. However, this changed on January 31, 1964 when the Food Stamp Act began

guaranteeing food for those in poverty. Households can access the government's Supplemental Nutrition Assistance Program (SNAP) to purchase food at grocery stores and at restaurants in some areas. However SNAP benefits cannot be used to buy alcoholic beverages, pet food, vitamins or medicine, or other household supplies. Several times in the history of SNAP, Congress has considered placing limits on the types of food that could be purchased with program benefits. However, they concluded that designating foods as luxury or non-nutritious would be administratively costly and burdensome. Therefore soft drinks, candy, cookies, snack crackers, ice cream and other unhealthy food items are eligible for purchase through the program. This minimally restricted system has led to unhealthy choices by program recipients (Baum, 2011). Not surprisingly, the highest rates of obesity in the United States are found among groups of people with a lower socioeconomic status. This is evidenced by the fact that Mississippi is the state with the highest percentage of African American residents, the highest obesity rate, and the fifth lowest median household income.

The link between obesity and socioeconomic status may be related to dietary energy density and energy cost. Less stringent genetic engineering laws have allowed genetically modified corn to be converted into high fructose corn syrup, which is a component of certain cheaply produced, less healthy food options (Rashad, 2003). Drewnowski and Darmon (2005) explain that foods containing refined grains, added sugars, and added fats are among the lowest-cost sources of dietary energy. The food supply of the United State is growing at a faster rate than its population. Relative to healthier food options, they are inexpensive, good tasting, and convenient. In contrast, the more nutrient-dense lean meats, fish, fresh vegetables, and fruit generally cost more. Because of the inverse relationship between the energy density of foods and their energy cost, more energy-dense diets are associated with lower daily food consumption costs and may be an effective way for people with lower socioeconomic statuses to save money (Drewnowski and Darmon, 2005). This would explain why people with lower socioeconomic statuses are more likely to consume less healthy food, thereby increasing their risk of becoming obese.

There are differences in the correlation between obesity and health-related quality of life variables among people of different races. Bentley et al. (2011) suggests that overweight Blacks may have a higher health-related quality of life than normal-weight and obese blacks. This may be due to the premise that for Blacks, low weight may be an indication of poor health. This is related to the perception of weight loss associated with HIV/AIDS, cancer, and drug addiction. There may also be greater competing mortality risks among Blacks, which obscure the impact of obesity on survival (Bentley et al. 2011).

Another explanation is related to the intergenerational transmission of culture. Food preparation and consumption is associated with many aspects of human social and cultural life. Recipes and food preparation methods and traditions are passed from one generation to the next based on ethnic cultural identity. The dichotomy of "soul food's" association with oppression and slavery, but also with cultural pride demonstrates a significant aspect of Black historical culture in America. It was the food of slaves and is still consumed by Americans today regardless of race (Henderson, 2007). The diet of slaves consisted of such discarded items as pigs feet, ears, intestines, skin, etc. – the worst parts of the animal, those not consumed by slave masters. These items are still consumed today in restaurants, at family gatherings, and during holiday celebrations.

Food environment and obesity

A number of studies have examined the association between the food environment and the prevalence of obesity (Jacobson et al. (2011), Reidpath et al. (2002); and Ritzer (2011)). These studies find that the local retail food environment is a significant factor in observed obesity rates. Residents with better access to supermarkets and limited access to convenience stores may have lower levels or reduced risk of obesity, as well as healthier diets, including higher intakes of fruits and vegetables. Healthier foods are typically sold at supermarkets and a variety of other retail venues within a community, including farmers' markets and specialty stores (Grimm, et al. 2013). However, in hundreds of neighborhoods across the country, nutritious, affordable, and high quality food is unavailable. Residents of many urban low-income communities do not have access to healthy food due to a lack of access to grocery stores, farmers' markets, or other sources of fresh food. Instead they are surrounded by fast food establishments and convenience stores which sell high-fat, high-sugar, processed foods. In cities like Detroit and New Haven, produce quality is lower in low-income minority communities compared to more wealthy or racially diverse neighborhoods (Treuhaft and Karpyn, 2010).

A food desert is defined as a geographical area, particularly in lower-income neighborhoods and communities, where access to affordable, quality, and nutritious foods is limited. Nutritious foods are defined as those that follow the United State Department of Agriculture's (USDA) Dietary Guidelines for Americans, which are designed to promote health and reduce the risk of major chronic disease. In order to fully understand and categorize the severity of food deserts, the USDA measures the accessibility to healthy foods by the distance from consumers' residences to the nearest food retailer that offers healthy and affordable foods (Jacobson, et al., 2011). Poor-quality retail food environments in disadvantaged areas, along with limited individual economic resources, contribute to an increased risk of obesity within racial and ethnic minorities and socioeconomically disadvantaged populations (Ford and Dziewaltowski, 2008).

Data and empirical methods

This study uses data from the CDC and the U.S. Census to examine the factors that influence state level obesity rates. According to the CDC overweight and obesity are both labels for ranges of weight that are greater than what is generally considered healthy for a given height. For adults, overweight and obesity ranges are determined by using weight and height to calculate a number called the "body mass index" (BMI). BMI is used because, for most people, it correlates with their amount of body fat. An adult who has a BMI between 25 and 29.9 is considered overweight. An adult who has a BMI of 30 or higher is considered obese (CDC, 2012).

The Supplemental Nutrition Assistance Program (SNAP) offers nutrition assistance to millions of eligible, low-income individuals and families and provides economic benefits to communities. In 2011 state agencies issued approximately \$71.8 billion in SNAP benefits. These benefits were issued to a monthly average of 21.1 million

households. The average monthly benefit was \$132 per person.² It is expected that states with a higher amount of SNAP benefits per person will have lower obesity rates, as these funds allow lower income individuals to purchase healthier, more expensive food items.

Increases in the pervasiveness of obesity appear to correspond with decreases in physical activity. Although physical activity and weight are related, the precise nature of the relationship remains uncertain. Research strongly suggests that exercise is a necessary element of any program for weight control and health improvement (Grilo, 1994). The level of physical activity is measured by the variable No Leisure-Time Physical Activity (LTPA). The estimates for LTPA were derived by the CDC using data from the census and the Behavioral Risk Factor Surveillance System (BRFSS) for 2011. BRFSS is an ongoing, state-based, random-digit-dialed telephone survey of the U.S. civilian, non-institutionalized population aged 18 years and older.

The prevalence of obesity is increasing among all age and racial groups in the United States. However, there is a disproportionate rise in the prevalence of obesity among African-Americans (Cossrow and Falkner, 2004). The U.S. Census defines a Black or African American person as a person having origins in any of the Black racial groups of Africa. Information on race is required for many Federal programs and is critical in making policy decisions, particularly for civil rights. States use these data to meet legislative redistricting principles. Race data also are used to promote equal employment opportunities and to assess racial disparities in health and environmental risks. The Census Bureau collects race data in accordance with guidelines provided by the U.S. Office of Management and Budget, and these data are based on self-identification. The racial categories included in the census questionnaire generally reflect a social definition of race recognized in this country, and not an attempt to define race biologically, anthropologically or genetically. It is recognized that the categories of the race item include both racial and national origin or socio-cultural groups.³

The modified retail food environment index (mRFEI) measures the number of healthy and less healthy food retailers within census tracts across each state as defined by typical food offerings in specific types of retail stores (e.g., supermarkets, convenience stores, or fast food restaurants). Out of the total number of food retailers considered healthy or less healthy in a census tract, the mRFEI represents the percentage that are healthy. The mRFEI is a way of measuring the number of healthy and less healthy food retailers in an area using a single number. Out of the total number of food retailers in that area considered either healthy or less healthy, the mRFEI represents the percentage that are healthy. Therefore, lower scores indicate that census tracts contain many convenience stores and/or fast food restaurants compared to the number of healthy food retailers. A zero score indicates that no healthy food retailers (supermarkets, large grocery stores, produce stores or supercenters) are located in the census tract. (Jilcott et al. 2010).

To approximate access to healthy food retailers, the CDC analyzed 2011 data from various sources using census tracts as the unit of analysis. According to Grimm et al. (2013) the term access refers to potential access to healthier food retailers. Thus in this study the availability of healthier food options is estimated by calculating the

² SNAP State Activity Report, Fiscal Year 2011

³ U.S. Bureau of the Census, Population Estimates Program (PEP), Race

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. Census tracts are small, relatively permanent subdivisions of counties designed to be similar in population characteristics, economic status, and living conditions (Grimm, et al. 2013).

Our hypothesis is that obesity rates are determined by Supplemental Nutrition Assistance Program (SNAP) benefits per person, the percentage of residents with no leisure-time physical activity (LTPA), median household income, percentage of African American residents, availability of healthy food options within a half-mile, and the Modified Retail Food Environment Index (mRFEI). 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)

Empirical results

Table 1 presents the states with the highest and lowest obesity rates, along with the national average for each variable for the year 2013. Twelve states had obesity rates over 30 %. The prevalence of obesity and physical inactivity were the highest in Mississippi, Louisiana, West Virginia, Alabama, and Michigan, three of which are Southern states. These states had an average obesity rate of 32.9 % compared to the national average of 28 %. While the U.S. average physical inactivity rate was 23 %, these 5 states averaged 28 %. The highest obesity rate, 34.9 %, was found in Mississippi. According to the University of Mississippi Medical Center obesity is the most important threat to the health of Mississippi residents (Tabak, et al. 2013). One out of every three adults is considered obese, making Mississippi the fattest state in the nation. Mississippi also had the highest percentage of African American residents, 38 % and the highest percentage of residents with no physical activity, 31 %.

The 5 states with the lowest obesity rates included Colorado, Hawaii, Massachusetts, New Jersey, and California. The average obesity rate for these states was 23 %. Colorado had the lowest percentage of obese residents, at 21 %, almost 8 % less than the national average. The average median household income of these states is \$59,339, which is almost 40 % higher than the states with the highest obesity rate. It is also of some interest to note that these states have considerably lower African-American population percentage than their high obesity counterparts.

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

Table 2 presents the ordinary least squares regression results. The OLS results conform to our expectation that states with higher percentages of African American

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=***

residents are likely to have higher obesity rates. The effect of the African American Resident Percentage (with $t=3.94$) is positive and significant indicating that a greater percentage of African American residents coincides with a higher rate of obesity. The Beta coefficient, .45 implies that a one standard deviation increase in the percentage of African American residents leads to a .45 standard deviation increase in the predicted obesity rate, with other variables held constant. The availability of healthy food options within a half-mile of the residence (with $t=-3.67$) is also significant and suggests that the convenience of healthy food options reduces obesity rates. This supports the finding of Drewnowski et al. (2012) that the type of supermarket was significantly correlated with the prevalence of obesity. However, unlike the aforementioned study, we find that proximity has a significant impact.

The results also show that lower SNAP benefits leads to higher obesity rates. This finding implies that households with lower discretionary finances are perhaps forced to buy cheap processed foods with high fructose corn syrup. As a result, they are more likely than other segment of the population to be obese and afflicted with diabetes and other related ailments. Finally, the regression results also confirm the hypothesis that no and low-levels of physical activity are significantly associated with high rates of obesity.

Conclusion

This paper describes an archival study of factors that influence or state level obesity rates. While our findings are not surprising due to the heightened awareness regarding obesity and health in the United States over the past decade, this study provides empirical evidence linking the pervasiveness of obesity to the dispersion of Supplemental Nutrition Assistance Program (SNAP) benefits, the percentage of African American residents, 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.

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