

# The South Does Not Make You Fat: A Study of Nutrition, Food Security, and Obesity

Research by Patricia A. Duffy, Claire Zizza, and Henry Kinnucan, Auburn University

By now it is common knowledge that America is fat. Two-thirds of adults, according to a recent study, are overweight or obese, up from 15 percent in 1980. Obesity among children is also rising, exposing another generation to higher risk for diabetes, heart conditions, and other health maladies. It is also frequently reported that obesity rates are higher in the South. In a recent study, seven of the top ten states with the highest obesity rates are in the South.

What makes us fat? And why are Southerners apparently heavier than others? Most would respond to that question with the timeless equation: calories in, calories out. Too many of the former and not enough of the latter make us fat. But in their recent paper, “[Nutrition, Food Security, and Obesity among Low-Income Residents of the South](#),” grantees Patricia A. Duffy, Claire Zizza, and Henry Kinnucan find a more complicated story. They find, for example, that it is not region per se that leads to obesity, but the higher prevalence of people with lower incomes and more minorities, both of which are risk factors in obesity.

## Study Description

To analyze the connection between obesity and demographic and lifestyle patterns, the authors use the 1999 to 2002 National Health and Nutrition Examination Survey (NHANES). They limit their study to the approximately 4,000 respondents who were aged 20 to 60, who were neither pregnant nor lactating, and whose survey details included body measurements.

The authors used body mass index (BMI) to gauge an individual’s weight in relation to height. A BMI between 25 and 29.9

is considered overweight. A BMI over 30 is considered obese. For a 5’6” individual, a one-

unit change in BMI is roughly equal to a weight change of six pounds.

The authors test two scenarios in narrowing down the factors that might explain a correlation between higher

BMI or obesity. The first scenario includes controls for gender, age, income, race-ethnicity, and education. Each of these has been found in past studies to play a role in weight.

In a second scenario the authors also examine the correlation between obesity and several

lifestyle factors, including food insecurity, diet quality, alcohol and cigarette use, and activity level. To measure

### What is BMI?

Body Mass Index (BMI), a measurement that accounts for weight with respect to height, can be used as an approximate assessment of body fat in most people. BMI is calculated by taking a person’s weight in kilograms (kg) dividing it by their height in meters (m) squared.



food insecurity, they used the U.S. Department of Agriculture's time-tested measure, which broadly is defined as access by all people at all times to enough food for an active, healthy life.<sup>1</sup>

To measure diet quality, the authors use the Health Eating Index-2000. The HEI assesses whether individuals conform to federal dietary guidelines for grains, vegetables, dairy, meat, and fruits, as well as fat, saturated fat, cholesterol, and sodium. It also measures variety of diet.

To assess activity level, the authors use self-reports of activity, as either higher or lower than peers. Smoking included currently smoking cigarettes, and alcohol included consuming 12 or more drinks in the past year.

The authors also analyzed associations between weight and region of the country, either Northeast, Midwest, West, and South.<sup>2</sup> They also tease out results for the deep South, which includes South Carolina, Tennessee, Georgia, Alabama, Mississippi, Louisiana, and Arkansas.

## Link between Food Security and Obesity Differs by Gender and Race

The authors find no link between food insecurity and obesity for women, after accounting for dietary quality, activity level, smoking and drinking, as well as education and income. For men, food insecurity was associated with lower BMI after taking these other factors into account.<sup>3</sup>

BMI appears to differ by race-ethnicity. Being a black woman was a significant predictor of higher BMI, even when income, age, diet, and other factors were considered. Being a black man, in contrast, had no such effect. There was no effect of being Hispanic on BMI either for men or women.

1 The U.S. Department of Agriculture defines "marginal food insecurity" as one or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake. It defines "food insecurity without hunger" as reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake. "Food insecurity with hunger" is reports of multiple indications of disrupted eating patterns and reduced food intake.

2 Northeast includes Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania. The Midwest includes Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, Kansas, and Nebraska. The West includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The South includes Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia, Maryland, Washington, DC, Delaware, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas.

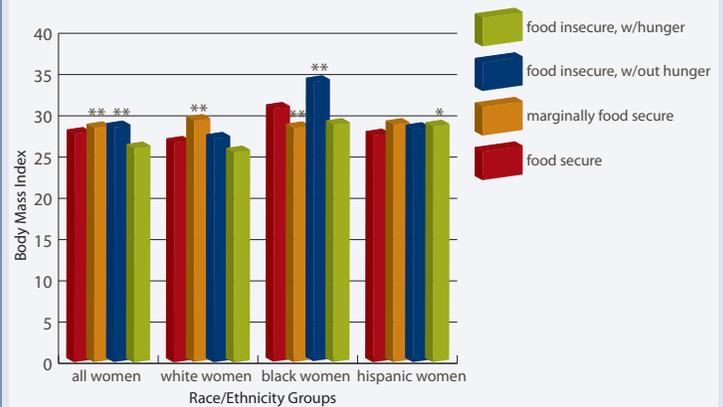
3 Before taking dietary factors into account, the authors had seen some indication that the more intense the food insecurity, the higher the likelihood of being obese for black women. For white women, even moderate food insecurity was a predictor of obesity. For men, regardless of race-ethnicity, the authors found that their BMI declined when food insecurity intensified.

## Association between Food Insecurity and BMI

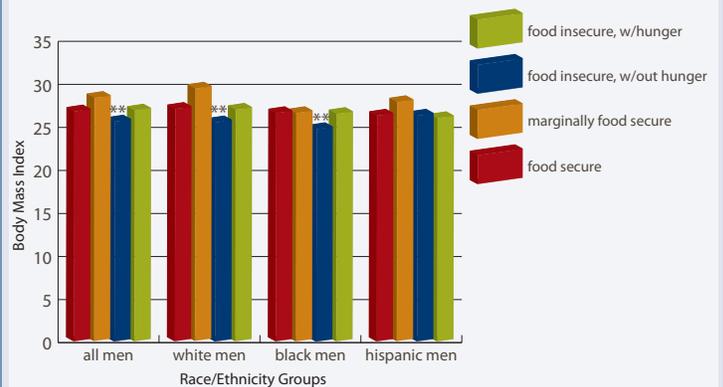
The first graph below shows BMI by food security category for all women, and then for sub-groups of women based on their race-ethnicity. The lower graph provides the same information for men. These means are not adjusted for any demographic or lifestyle factors.

These findings suggest a link between food insecurity and increased BMI for all women and for each sub-group. However, when demographic and lifestyle factors are controlled, there is no connection between food insecurity and BMI for women. For men, food insecurity is associated with lower BMI, even when other factors are taken into account.

BMI by Food Security Category, Unadjusted Means - Women



BMI by Food Security Category, Unadjusted Means - Men



Respondents aged 20 to 60, who participated in MEC examination. Significance is compared to the fully food secure group within each column, with \* indicating significance at the 10% level and \*\* indicating significance at the 5% level.

Past studies have speculated that food insecurity can lead to obesity if weight gain was an evolutionary response to periodic food shortages. Populations that suffered constant food shortages, such as Native Americans, might have adapted by storing more fat in their bodies to be tapped during times of famine. Given the findings here on food insecurity, this explanation does not appear to be the case among this sample.

Evolutionary theories also cannot explain the rapid increase in obesity since the 1980s. Therefore, recent authors have suggested that people have grown fatter as food has become cheaper, particularly high-calorie foods. The cost of soft drinks, for example, today's "number one food consumed in the American diet" calorie-wise, declined by more than 20 percent. Food scientists have also been working hard to find the perfect combination of salt, sweet, and fat to "unlock the code of craveability."<sup>4</sup>



### What are food deserts?

Food deserts are areas where the majority of residents must drive more than 10 miles to a supermarket chain or supercenter.

Still others contend that the number of fast-food restaurants in poor neighborhoods (where the food insecure are more likely to live) might contribute. Relatedly, food deserts might lead to poor diets, and thus weight problems. When larger supermarkets are farther away, families in food deserts often must rely on small convenience stores or poorly stocked mom and pop stores. Fruits, vegetables, and other healthy items are often not stocked as frequently in these stores.



### Diet Quality, Exercise, Cigarettes, Alcohol, and Obesity

Better diets were clearly associated with lower BMI for men and women overall.<sup>5</sup> However, diet quality had no effect in low-income subsamples. That is, in testing this connection, the authors find that although these low-income individuals had lower

BMIs when their diets were better, the effect was no different from what might have occurred by chance.

The direct effect of smoking on BMI was large for all groups. Smokers were less likely to be overweight. Alcohol had no

<sup>4</sup> See Eric Finkelstein, *The Fattening of America* (New York: Wiley, 2009); and David A. Kessler, *The End of Overeating* (New York: Rodale, 2009), as reviewed by Elizabeth Kolbert in the July 20, 2009 issue of *The New Yorker* (pp. 73-76).

<sup>5</sup> These findings are from the full model, which includes controls for race-ethnicity, income, education, activity level, diet, and smoking and drinking.

direct effect on BMI for women, although it lowered BMI significantly for men, and particularly poor men.

The largest effect on weight was activity level, particularly for women. A change in activity level from low to high was associated with a loss of approximately 26-37 pounds on a 5'6" individual.

### The South Does Not Make You Fat

The authors also examine whether obesity is somehow linked to where we live. Contrary to many other studies, they find that the likelihood of being overweight or obese does not significantly differ across regions of the country (South, Northeast, Midwest, and West), after accounting for income, age, race-ethnicity, and education.

Because these results run counter to many prior reports, the authors suspected that the large group of states labeled "South" might be diluting the effects. States such as Washington, DC, or Virginia report modest rates of obesity, for example. Therefore, they may lower the overall averages for the South. The authors redid the analysis with only those states considered the "deep South"—Arkansas, Mississippi, Louisiana, Georgia, Alabama, Tennessee, and South Carolina.

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At first glance, BMI and obesity were higher in the deep South than elsewhere, but again the differences disappeared once factors such as age, income, and race-ethnicity were included. Therefore, the reason for the weight discrepancy lies more in the demographics of those who live in the deep South and less about region per se. Low income, for example, is a better predictor of being overweight or obese for women than living in the South, as is being black or Hispanic. The deep South, in particular, has higher minority populations and more poor individuals than other regions of the country.

Lifestyle factors also had some impact, although less than income and race-ethnicity. Poorer diet quality, for example, was associated with higher BMI for women, although the effect was smaller for men. Across all regions of the country,

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becoming more active was again a big determinant in dropping weight. Smoking cigarettes also kept the weight off no matter where one lived, although that is hardly a healthy strategy. Drinking lightly was associated with lower BMI, although binge drinking was associated with higher BMI. Food insecurity had no effect on weight for women, but being food insecure without hunger was associated with lower BMI for men.

## Recap

Food insecurity is not a decisive factor in weight issues. Overall, only the most severe food insecurity (food insecurity with hunger) had an effect on weight gain and obesity, and then only for men, for whom food insecurity with hunger was associated with lower BMI. It appears that for these men, food insecurity leads to poorer diets, which in turn is associated with lower BMI. One exception to this trend arises when examining the relationships by race-ethnicity. In this case, black women who face food insecurity (without hunger) are more likely to be heavier than those who are secure.

The results also show that although women in the deep South are heavier than their peers in other regions, their weight is a product of other factors than being Southern. Lower incomes, greater shares of minorities, and other factors common to the South explain the differences more thoroughly than region of the country per se. By far the clearest distinction between those of normal weights and overweight, however, is level of activity. Being more active is most clearly and directly associated with healthier weights.

## Policy Implications

Putting a price tag on the cost of obesity is difficult, but it is clear that it costs the nation. Recent studies have indicated that Americans' extra bulk, for example, is responsible for a quarter billion dollars in extra jet fuel annually. Hospitals have had to buy special equipment to accommodate fatter Americans. Revolving doors have had to be widened. Movie seats are bigger.<sup>6</sup> Most costly, however, is the higher health care costs. If preventive measures are not instituted, the costs of Medicare and Medicaid are sure to rise as overweight adults face higher weight-related health issues, ranging from heart disease to

bad backs. Some estimates put the costs of America's expanding waistlines at \$90 billion a year in increased medical spending.<sup>7</sup>

Given the results reported here, two avenues of prevention might focus on increasing activity levels and improving diet. Subsidizing gym memberships or encouraging activity breaks at work could help increase activity levels. Particularly for low-income families, activities at work could compensate for the lack of inviting (and safe) places to exercise in their neighborhoods. Nutrition classes or workshops could also help contribute to healthier diets. In some of the more isolated rural areas of the deep South, "food deserts" are a real concern because they limit access to healthy foods. Food deserts are areas where the majority of residents must drive more than 10 miles to a supermarket chain or supercenter.<sup>8</sup> The World Health Organization has offered other policy options, including a subsidy and fiscal policies that promote healthy eating, better health education and greater access to physical activities, regulations on food and beverage advertising, ensuring access to sidewalks and bike paths as well as encouraging businesses to offer physical activities and facilities to employees, and careful monitoring of obesity and physical activity for continued research.<sup>9</sup>



One item that policymakers should look for in studies on obesity is whether they include gender and activity level. Few studies to date have included these factors as controls in studies. Doing so can offer more nuanced insights into factors contributing to obesity. This nuance can be used to more accurately target programs to stem the rise in obesity.

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<sup>7</sup> Francis Delpuech et al., *Globesity* (Earthscan, 2009).

<sup>8</sup> Lois Wright Morton and Troy C. Blanchard, "Starved for Access: Life in Rural America's Food Deserts." *Rural Realities* issue brief series, vol. 1, no. 4 (2007).

<sup>9</sup> World Health Organization, "Global Strategy on Diet, Physical Activity, and Health (Geneva: WHO, May 2004), available at <http://www.who.int/dietphysicalactivity/strategy/eb11344/en/index.html>.

<sup>6</sup> Elizabeth Kolbert, "Why Are We So Fat?" Book review. *The New Yorker*, July 20, 2009.