

Discount food and restaurants stand out as major factors in the obesity epidemic

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Do warehouse stores contribute to the obesity epidemic? Ryan Ozawa/Flickr, CC BY-NC-SA

Obesity has reached epidemic proportions in the United States. The proportion of US adults who are obese – defined as a body mass index (BMI), a measure of body fat based on height and weight – of at least 30, has risen from [13% in 1960](#) to [35% in 2011-2012](#). Estimates of the annual costs of obesity include [112,000 lives lost](#) and [US\\$190 billion](#) in medical expenses.

Economists have been trying to pinpoint some of the [economic factors](#) that could have contributed to this rise in adult [obesity](#) for years.

Some have examined the role of cheaper and more readily available food, as measured by [grocery food prices](#), [restaurant prices](#), [access to restaurants](#), [access to supercenters](#), or [receipt of food stamps](#). Others have focused on incentives related to physical activity. For instance, [cheaper gasoline](#) may lead to more driving and less walking, while [urban sprawl](#) reduces community walkability.

Still other studies ask whether tobacco control measures such as [cigarette taxes and smoking bans](#) may have had the unintended consequence of contributing to the rise in obesity, since nicotine can be a metabolic stimulant and appetite suppressant. Finally, another category of studies estimates the role of changing characteristics of the labor force, such as the [rise in female labor participation](#) (which might lead to an increased reliance on convenience food) and the [increasingly sedentary nature of jobs](#).

These are some of the numerous different factors that could have played a role in the skyrocketing obesity rate. But which ones have the greatest influence? To figure that out my colleagues and I compared 24 factors attributed to the rise in [adult obesity](#) to understand which ones had the biggest effect.

So what factors have the most influence on obesity?

In a [working paper](#) recently released by the National Bureau of Economic Research, Joshua Pinkston, Christopher Ruhm, George Wehby and I combine these factors and others into a single model to figure out which ones have contributed to obesity the most.

To do this we matched state-level data on 24 different economic factors to data on 2.9 million people from the CDC's [Behavioral Risk Factor Surveillance System](#) from 1990 through 2010. After controlling for demographics, state and year, we were able estimate the effects of these economic factors on weight outcomes.

Economic factors alleged to impact BMI	
Fast food price	Proportion central city
Grocery food price	Urban sprawl
Alcohol price	Cigarette prices
Relative prices of fruits and vegetables	Work hours
Supercenters/warehouse clubs	Unemployment rate
Supermarkets	Median household income
Convenience stores	Female labor force participation rate
General Merchandisers	Male labor force participation rate
Food stamps	Proportion active job
Restaurants	Proportion blue collar
Gasoline prices	On-the-job exercise
Fitness centers	Clean indoor air laws

All of these factors contribute to obesity epidemic, but some have more of an effect than others. Credit: Charles Courtemanche/NBER, Author provided

The analysis is essentially a "statistical horse race" to see which, if any, of the these factors that are alleged to have contributed to the obesity epidemic stand out once all the possible contributors are mixed together and analyzed statistically.

All factors play a role in obesity

Taken together, we estimate that these 24 economic variables together explain 37% of the rise in BMI across the country, 43% of the rise in obesity, and 59% of the rise of what is called moderate and [severe obesity](#), defined as a BMI of 35 or higher (called [class II/III obesity](#)).

We calculated these percentages by estimating the effects of the economic factors on each weight outcome (eg BMI), and then we multiplied these effects by the observed changes in the economic variables during the sample period. Then we divided the result by the overall change in the weight outcome during the sample period.

This means that how people respond to changing economic incentives appears to explain a lot of the upward trend in weight. And this especially large influence on the rise in severe obesity is particularly important, as the severe obesity threshold is where the [increased mortality risk from obesity](#) begins to appear. In other words, economic incentives do not affect BMI uniformly throughout the population. The

impact is concentrated among those who already obese.

More restaurants and gigantic grocery stores

When we look at these factors on their own, two stand out as the "winners" of the horse race.

First is the increase in restaurants per capita, which by itself explains 12% in BMI, 14% of the rise in moderate obesity, and 23% of the increases severe obesity. Greater availability of restaurant food likely increases obesity because more people are substituting relatively unhealthy restaurant meals for home-cooked meals. And fast food is not the lone culprit. If we split the restaurant variable into fast-food and full-service restaurants, their estimated effects are similar.

The second major contributor is the increase in superstores, like Walmart SuperCenters and warehouse club chains like Costco, Sam's Club and BJ's Wholesale Club, per capita. This factor accounts for 17% of the rise in BMI, 16% of the rise in moderate obesity, and 24% of the growth in severe obesity.

Perhaps the most likely explanation for the impact of these stores on obesity is that they sell food at a [discount of around 20%](#) relative to a traditional grocery store. It's also possible that buying food in bulk contributes to overeating.

But if we split the superstore variable and look at certain stores on their own, we find that Walmart Supercenters have roughly the same effect as warehouse clubs, which often sell food in bulk. And since Walmart Supercenters sell food in traditional package sizes, this seems to rule out bulk-buying as being the leading explanation.

Cheap food isn't a bad thing

While restaurants, supercenters and warehouse clubs appear to have contributed substantially to the rise in obesity, this doesn't necessarily mean that they are bad for society. The availability and affordability of [food](#) brought about by these businesses are undoubtedly of substantial benefit to consumers. Our results simply suggest that

progress comes at a cost. Future research should investigate the reasons why restaurants and superstores contribute to obesity with the aim of helping policymakers develop targeted solutions.

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