

# Study highlights limitations of BMI in predicting death

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BMI, which was first proposed a Belgian mathematician in the 19th century, is calculated by dividing a person's weight by the square of their height.

People classified as overweight though not obese are not at a higher risk of death, according to a new study Wednesday that underscores the limitations of the body mass index (BMI), long a standard medical

metric.

The findings, published in the journal *PLOS ONE*, come as populations in both rich and poor countries are becoming heavier. In the United States, more than 70 percent of adults are defined as either overweight or obese.

BMI, which was first described by a Belgian mathematician in the 19th century, is calculated by dividing a person's weight by the square of their height. It is increasingly seen as a crude instrument for measuring individual health.

Lead author Aayush Visaria of Rutgers University told AFP: "I think the real thing that people should get from this is that BMI by itself is just not a great indicator of health."

Measuring waist circumference or performing a type of scan that visualizes bone density, body fat and muscle mass should also be used for a more holistic interpretation, he said. Having excess fat still increases risk for a range of conditions including heart disease, stroke and diabetes.

"I've seen patients with the same exact BMI, but with vastly different metabolic and health implications. So I wanted to investigate this further," added Visaria, a physician.

Older studies on the link between weight and death rates drew inconsistent and uncertain results, and were mostly focused only on non-Hispanic white adults.

In the new work, Visaria and his co-author Soko Setoguchi drew on data on more than 550,000 American adults from the 1999-2018 National Health Interview Survey and the 2019 US National Death Index.

They calculated BMI based on the self-reported height and weight of the participants, and gathered data on demographics, socio-behavioral factors such as smoking and physical activity, underlying health conditions, and access to healthcare.

More than 75,000 people who were included in the study died during the period of research.

After adjusting for other variables, the results showed that people with a BMI between 25 and 30, which is classified as overweight, did not have an increased risk of death compared to people whose BMI was between 22.5 and 24.9.

However, the mortality risk rose markedly among people whose BMI was under 20, and those with BMI greater or equal to 30, defined as obese.

## **Obesity carries higher death risk**

For example, a person with "third degree" obesity, defined as a BMI of 40 or above, but had never smoked and had no history of cardiovascular disease or non-skin cancer, was more than twice as likely to die as an equivalent counterpart with BMI defined as average.

The average age of participants was 46. Half were female, and 69 percent were non-Hispanic white. Of those included, 35 percent had a BMI between 25 and 30, and 27.2 percent had a BMI above or equal to 30.

"It's a large study with a representative sample which is good," George Savva, a biostatistician at the Quadram Institute in the United Kingdom, told AFP. "The authors have, as far as I can see, done a good job of analyzing the mortality link with baseline weight status."

He added it might be the case that diseases linked with higher weight are managed better than they once were, for example high blood pressure and high cholesterol.

"So you would expect the relationship between weight and death to change over time, which potentially is what this is showing," Savva said.

**More information:** Body mass index and all-cause mortality in a 21st century U.S. population: A National Health Interview Survey analysis, *PLoS ONE* (2023). [DOI: 10.1371/journal.pone.0287218](https://doi.org/10.1371/journal.pone.0287218)

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