Why are we in the middle of an obesity epidemic? Here is a possible explanation

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Since 2010, the number of people with obesity in Denmark has doubled, while other countries have seen an even greater increase. But what started this, and what is driving it? Professor Emeritus Thorkild I. A.

Sørensen outlines the obesity epidemic and proposes a new theory.

Recent years have been characterized by all-encompassing health crises. But below the surface, a new crisis has been brewing.

An increasing part of the Danish population is overweight. Since 2010, the number of people with obesity in Denmark has almost doubled to 18% of the adult population.

But why is the number of people with overweight increasing here and in the rest of the world? And when did we start to put on weight?

We have asked Sørensen to help us answer that question. His recent research has been published in *Science Advances*, *Science* and *Philosophical Transactions of the Royal Society B: Biological Sciences*.

"The WHO and health authorities all over the world agree that we have a crisis on our hands. Unlike the COVID-19 pandemic, though, it has been slow to get going. In that sense, it bears more resemblance to the climate crisis. Soon, one billion of the world's 8 billion people will have obesity," he says.

But it did not start yesterday. This crisis has been a long time coming.

Before McDonald's and Coca-Cola

"We still don't know why, but the obesity epidemic began well before World War Two—long before McDonald's, Coca-Cola, TVs, personal computers and ultra-processed foods—the things we are so quick to blame. In fact, it remains a mystery to me and other researchers what started it," says Sørensen.

In Denmark, we have several large national health registers, and a few go

all the way back to the 1930s and 40s. They contain data for the weight and height of all schoolchildren as well as young men in the Copenhagen area (recorded in connection with their conscription examination).

Sørensen helped build these registers to give researchers access to historical data.

"Even among children born in the 1930s there was a pattern. It was already visible when they started school. For each year of birth, the 25% who weighed the most would put on more and more weight, while their classmates remained almost unchanged. So, the schoolchildren who weighed the most continued to put on weight, and the same applied to the young men undergoing conscription examination," he says and adds,

"It suggests that this part of the population was and is affected by an unknown process, and that it has nurtured the growing obesity epidemic. The important question is: What triggered this process? If we are able to answer that question, we may be able to revers and prevent it."

This leaves Sørensen and other obesity researchers with several unanswered questions about what makes the body put on weight.

Unanswered questions

"The prevailing immediate explanation is that as people with excess body fat eat more than others, and that this is the reason why they have put on weight in the past. But that is not case. The food they currently eat is used to maintain the metabolism of organs, muscles and bones. So the big question is: What makes the body store calories in the fat tissue?" says Sørensen.

The researchers know that genetic makeup is an important factor, and that genetic differences cause some people to store more fat than others,

but they don't know how and why. And even though it is true that our genetic makeup can change over generations, it cannot account for the growing number of people with obesity—the number is simply increasing too fast.

"Genetics cannot explain the global increase in obesity. Something in our environment has changed, something vital for the body functions. The fact that we have access to more food and that fewer people are starving could pave the way for an obesity epidemic, but the big question is whether this is the whole story or whether other changes started it and kept it going," says Sørensen.

Researchers are still grappling with that question—and with trying to understand why the body chooses to store fat.

"The body does everything it can to protect its energy supply in order to maintain organ, muscle and bone function. If the food you eat does not enable the body to do that, it will use its fat deposits, and then you lose weight," he says.

"If you have lost so much weight that your body lacks energy, the body will try to get the needed energy by increasing the appetite and conserving energy in other parts of the system. But we still don't know why the body rebuilds the fat deposits once the energy crisis is over."

What we do know, is that it is not just the amount of food we eat that triggers the development toward obesity.

Various studies have looked at what happens if people suddenly increase their food intake. They may put on weight, some more than others, but they also easily lose it again when they return to a normal food intake. That is, unlike the obesity process, the fat deposits do not keep the fat in a way that are hard to get rid of, and will be rebuild after a while.

"We have learned that only a very small—immeasurable—portion of what you eat will on average many years later result in the fat mass that is visible to the naked eye—causing poor health, diseases and stigmatization. That is, it is not something you can control," Sørensen concludes.

Eat less and exercise more?

Why do some people have obesity and how do we get it off? Many think we know the answer. They should simply eat less and exercise more, right?

"We tend to think that the people with obesity eat too much and do not exercise enough, because we see that this is the case after obesity has developed. And that is why a lot of us believe that people with obesity have brought it on themselves. However, these behaviors are primarily consequences of obesity. Thus, alongside with development of obesity, also the energy-demanding non-fat part of the body (organs, muscles and bones) grows and is responsible for the increased food intake. Moreover, it requires more energy to move a heavier body, and since the same amount of energy is used for physical activity, the result is less movements", says Sørensen.

He proposes that at a fundamental level, we humans are evolutionary developed to cooperate on getting and sharing food. But if we are unable to work together, it may induced fear that we may starve, and that may cause the body as a safeguard to store extra fat.

"I believe there is a close relation between obesity and our social surroundings—mediated through a direct connection between the brain and the fat tissue. The brain probably asks the body to store excess fat in response to social challenges– obesity development becomes a fundamental psychosocial consequence," he says and adds,

"My theory is that social problems are converted into mental problems that trigger the processes in the brain. Research suggests that people tend to store extra fat when they are uncertain about whether there is enough food—and that is even when there is enough food."

It is same thing that happens, he argues, when people with obesity respond to the prevailing attitudes to obesity by putting on even more weight. He believes the prejudices, stigmatization and derived discrimination about obesity are contributing to worsen the obesity crisis.

"It feels like a psychosocial challenge, exacerbating the process," he says. "Therefore, fighting the prejudice, stigmatization and discrimination may be part of the solution."

More information: Mads Møller Pedersen et al, Emergence of the obesity epidemic preceding the presumed obesogenic transformation of the society, *Science Advances* (2023). DOI: 10.1126/sciadv.adg6237

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Thorkild I. A. Sørensen, An adiposity force induces obesity in humans independently of a normal energy balance system—a thought experiment, *Philosophical Transactions of the Royal Society B: Biological Sciences* (2023). DOI: 10.1098/rstb.2022.0203

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