



A Response to A Contamination Theory of the Obesity Epidemic



GoodToSell

Aug 12  

Time to try my hand at another unsolvable crisis of the modern world. It is my opinion that something doesn't add up about the increase in obesity and in all metabolic disorders in industrialized countries. There are a bevy of different theories out there, and it was my initial intuition that the problem, like many others plaguing complex systems, was multi-faceted. In addition, if there was an easy solution, epistemic humility would force me to contend with the fact that I'm just a layman in terms of nutrition, and other people should have stumbled upon the solution.

I'll lay my biases out right now: I didn't have a particular horse in this race diet-wise (as you can see from my initial reaction to the LessWrong post), but I definitely do want this to be an easy fix. Something along the lines of the prospect of plastics building up in us with no recourse is not a pleasant one to think about for me, I'd much rather we could just substitute an ingredient here or there.

Nevertheless, there is a theory that is so compelling that I would be remiss not to give my take here.

First, it is important to appreciate that there is something really weird (the Peery paper) about obesity in the modern world (PDF warning). The good people of LessWrong also seem to think so. I highly recommend skimming both those articles before you go forward with mine. I very much agree with their assessment of the weirdness of the epidemic. I also think our current explanations are quite lacking.

Where There's Smoke

I'll cut to the chase, I think the smoking gun in this whole thing is the addition of vegetable oils to our diet. I go into it a bit in my comment [here](#), but all that info will be the same as this post.

Firstly, I highly recommend reading [this](#) series of posts by Jeff Nobbs. He is more responsible for the meat and bones of this post than I am, I'm just relating it to the Peery paper and musing a bit. It lays out an excellent and compelling case for at least looking at vegetable oils as the culprit.

>Throughout our decades-long battle with chronic disease, Americans have closely followed everything the CDC, AHA, and USDA have told us to do. We're smoking less, drinking less, exercising more, eating less saturated fat and sodium, and eating more fruits and vegetables. Still, chronic disease and obesity rates continue to rise. All the while, vegetable oil has steadily and stealthily made its way into our pantries, restaurants, and packaged foods, now contributing 699 calories per day to our diets, or about 20% of everything we eat.

That about sums it up, I was quite convinced initially. From nearly nothing to 20% of our diet! The correlation is very striking, but the causal mechanisms aren't studied well at all in humans. It's actually quite weird how few good studies there are of vegetable oil in humans. The ones that are good are further in Nobb's series, and they seem to be really bad for vegetable oil.

Line by Line

As I find the assessment of the issue and mystery of obesity compelling in the Peery paper, I will use that as a starting point, attempting to rectify the thesis of vegetable oil with their diagnosis of the symptoms of the obesity epidemic. They list the following mysteries of the epidemic:

1. Changed over the last hundred years

Yep, [here's](#) an article going into its origin in the American diet. Note the potential conflicts of interest. Not a buyer of a conspiracy here, but there are cards on the table.

2. With a major shift around 1980

For the 1980 thing, I think they focus on that date a little too much, it's a monotonic increase in both oils and obesity all the way up. Nobbs cites [this](#) guideline, 1980 on the dot, that says "Avoid too much fat, Saturated fat, and cholesterol." As he notes, the public actually did an alright job following all these guidelines. We largely replaced the fats with soybean oil.

Additionally,

-It could be a threshold that got passed around that time—it looks like that's about when the average man went from just under to just about overweight BMI per the chart in the Peery paper.

-Perhaps a large cohort was hitting a certain age around that time?

-Global trade really starts kicking off, essentially [jumping from 10 to 15% of GDP in 1980](#). The US grows most of its own soybeans, but this could explain why other industrialized countries go up around then as well.

3. And whatever it is, there is more of it every year

Per Nobbs, it has been exploding. [Here's](#) another source.

4. It doesn't affect people living nonindustrialized lives, regardless of diet

Global trade, new invention from USA, ticks this box for me. In particular, the evidence from Cuba and the pacific islands in Peery really points towards the issue being primarily in something that is imported.

5. But it does affect lab animals, wild animals, and animals living in zoos

This is one of the most interesting points that the Peery paper goes into. If truly wild animals are having the same issues we are, then it would point towards their thesis of an environmental contaminant. However, I looked through their [source](#), and it seems that:

>In this light, we compiled data to assess time trends in body weight in mammalian species that live with or around humans in industrialized societies.

It primarily looks at animals in labs or under the direct supervision of humans. I didn't read every single source in that paper, but you can see for yourself. The animals look to

be eating food made by humans. When they looked at city rats, they got less obese than labrats. This would be consistent with the hypothesis that it is vegetable oil in human foods causing this, if wild rats eat less food made by humans as a proportion of their diet.

I dug through this paper a bit more, called “Canary in the coal mine.” It also cites [this paper](#) as evidence of

>That large population level changes in body weight distributions of mammalian populations can occur even when those populations are neither under obvious selection by predation nor are living with or among humans has been documented

This was what I was really looking for. Fat cats and raccoons make sense, what about the deer?

But the source says:

>In particular, the recent trend of increasingly warm winters in northern Europe and Scandinavia may lead to reduced body size and fecundity of red deer, and perhaps other ungulates, in those areas.

I don’t see the evidence here that contaminants in the environment from humans are causing an increase in the weight of animals that *don’t eat food made by humans*. That paper was all about climate change and deer getting smaller, I’m not even able to figure out why they were really citing it anyways.

Overall, I am not convinced that truly wild animals, eating their own food sources, are being taken for the obesity ride for us. I think all of this evidence is completely consistent with the vegetable oil hypothesis.

6. It has something to do with palatable human snackfoods, unrelated to nutritional value

The Peery paper says ‘diet’ or ‘nutritional value,’ but it mainly seems like they mean ‘macronutrients’ and sometimes sugar when they say that diet can’t be the answer. Nonetheless, this is still consistent with the vegetable oil hypothesis—go look at the ingredients for doritos, froot loops, or even store-bought bread.

7. It differs in its intensity by altitude for some reason

They go into some mechanisms, give it a read if you haven't. Maybe Colorado is an outlier. It definitely has a lot of young people who like the outdoors and crunchy granola. I don't know if this should make or break any theory of obesity per se. But it's certainly interesting. There's a lot of talk of lipids and oxidization in papers about veggie oils:

>Oxidized PUFA can be dangerous when in our bodies, especially since oxidative damage to fat-containing LDL particles is a primary factor in the development of heart disease.
[source](#)

Perhaps that's something—less oxygen, less oxidization, less CVD? I don't have the expertise—really no clue there. Oxidation does involve the addition of Oxygen to a molecule, and there is about 20% less oxygen at 6000 ft vs sea level. If you look at a [map](#) and squint, that's roughly the proportion that Colorado is less obese than an average US state. Interesting, but I truly have no idea about this. I think you'd be hard-pressed to use this as a lynchpin in an argument against vegetable oils. I think they make some really cool arguments pertaining to lithium, definitely check it out, but it just wasn't quite clicking for me in the way that vegetable oils do.

8. And it appears to have nothing to do with our diets

I really think it does. That would be the simplest explanation, vegetable oil or otherwise, and the introduction of vegetable oil is the simplest and most obvious change from what I can see. Given the timeline, and the spread of obesity with trade and industrialization, I find myself disagreeing here. Most experts seem to think it's some combination of diet and exercise and genetics.

It is still adding up

Alright, so I think vegetable oils explain almost if not all the mysteries of the Peery paper. A few more thoughts, citing the Peery paper:

But again, it's not just the contents. For some reason, eating more fat or sugar by itself isn't as fattening as the cafeteria diet

Well, not the fat or sugar contents. I think we have plenty of studies that show low fat vs low carb etc is kinda a wash. At least, no one can decide on it. But surely there's plenty of

vegetable oil in all those cafeteria foods.

When humans switch from an ancient to a Western lifestyle,” he says, “they experience increased waistlines, reduced insulin sensitivity, higher blood pressure and a host of related disorders and diseases.”

Same location, new lifestyle? If they didn’t also move, and there’s no indication they did, then I don’t see why you should say it’s in the water or the air, when a new lifestyle entails a complete diet makeover. I think this is actually one of the strongest points in favor of a dietary reason over environmental contaminants. Note that these oils do all these things to rats.

Diet won’t work—but a diet of only potatoes did. Chris Voigt ate only potatoes and he prepared them in a variety of ways, only one of which involved “a bit of cooking oil.” Whole food diets seem to help a lot. Those get rid of vegetable oils for sure. But so does fasting, so it’s hard to say. Switching from fats to carbs won’t get rid of the vegetable oils that are in near all processed foods though. There is near universal agreement that processed foods are bad, could this be the reason? Processed foods being bad seems weird to me anyways, what if something just gets chopped up?

“palatable supermarket food”; not only Froot Loops, but foods like Doritos, pork rinds, and wedding cake.

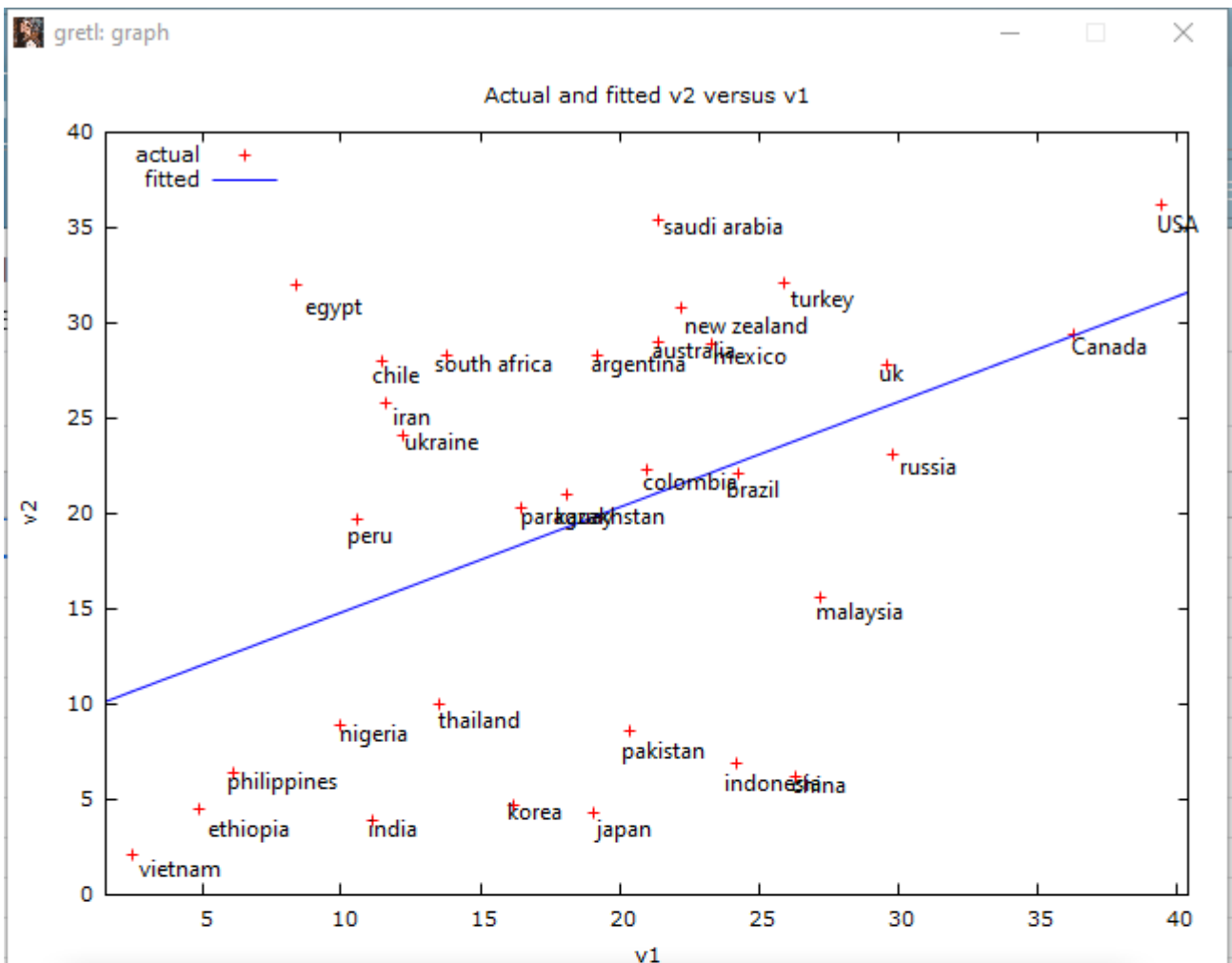
Oils are in doritos (ingredient 2), in froot loops (!!), presumably in ‘fried pork skins’. As for wedding cake, couldn’t find a good label on the internet, if it’s store bought it’s probably there though. Seriously, there’s vegetable oil in my Whole wheat bread.

Still on the Peery paper, which I really enjoyed reading, I actually doubt it’s chemical contaminants—you’d think China with the factories and air pollution, or the Congo with mines and terrible water would be worse than us. How polluted are New Zealand and Canada—they have quite high obesity. People in the USA are fatter in rural areas, and the USA really cleaned up its air and water in the past 60 years or so. I totally see where they’re coming from with some of their possible explanations, definitely check the Peery paper out. It’s a great read. However, I really think we should render unto Occam what is Occam’s—a group of added industrial oils went from nearly 0% to 20% of our daily calories, and it completely coincides with our issues.

I ran a really quick and dirty regression, with some sources:

Y axis is obesity %

X axis is vegetable oil intake per capita kg/cap



gretl: model 1

File Edit Tests Save Graphs Analysis LaTeX

Model 1: OLS, using observations 1-32
Dependent variable: v2

	coefficient	std. error	t-ratio	p-value	
const	9.25789	4.17656	2.217	0.0344	**
v1	0.552495	0.202689	2.726	0.0106	**

Mean dependent var	19.58438	S.D. dependent var	10.92975
Sum squared resid	2968.122	S.E. of regression	9.946728
R-squared	0.198507	Adjusted R-squared	0.171791
F(1, 30)	7.430153	P-value (F)	0.010603
Log-likelihood	-117.8852	Akaike criterion	239.7704
Schwarz criterion	242.7019	Hannan-Quinn	240.7421

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Some Stats on Obesity vs Vegetable oil

Alright, so yesterday I included a really quick regression of vegetable oil on obesity rate. Today I'll include a little bit more, and it doesn't look too good for our theory here. If you recall, here is our naive initial regression. The most obvious confounder that I can think of is GDP per Capita, I used PPP...

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EDIT: 8/12: here's more stats and they don't seem to implicate vegetable oils.

It's been a long while since I've done any stats, so again, stressing the quickness and dirtiness of this regression. In this case, I'm sure vegetable oil is a very, very strong proxy for the general "processedness" of any countries' food supply. Eyeballing it, I'm sure GDP per capita could explain at least a good portion of this too. Nevertheless, that certainly looks like something. I'd be especially interested in analysis of individual outliers here, is Saudi Arabia because they only count citizens in one data set? Is China using a ton of oil in factories? I sure don't know.

I certainly think whatever the true cause(s) is/are, it's probably some addition of the modern world. Just a century ago, diseases of civilization were vanishingly rare. Whatever the solution is, my money is on a solution via negativa as Nassim Taleb would put it. And a food only created 100 years ago certainly isn't Lindy.

A call for further study

Alright, elephant in the room time: Scott Alexander already did an excellent piece on this.

But I'm gonna nitpick a bit here. Keep in mind I have his essays in hardcover on my bookshelf, I love his work. The first half could be interchanged with my essay here and

you'd probably come away better informed than I just made you.

>I find this to be a really elegant and provocative theory, with impressive circumstantial evidence. Unfortunately, as far as I can tell all of the direct evidence is against it.

Theory seems to refer to this idea of vegetable oils being bad—a theory with which we have ample evidence to at least suspect is true, as he says. *Evidence* that he goes into mostly pertains to high saturated fat diets and why they're not necessarily good. Also note that I'm particularly concerned with Soybean oil as that is the bulk of the increase, and his study discussions don't involve it.

For the second part I don't see any reason why we shouldn't be nearly completely agnostic on high saturated fat diet, from my reading here, my takeaway is to avoid processed foods at the very least, and to especially avoid vegetable oils. I haven't seen anything to necessarily go in the direction of a saturated fat heavy diet in particular. I don't see why we don't have the option of a little olive oil, or just *not completely submerging all our food in some kind of fat or oil for 20% of our daily calories*. From what I can tell, there's a fair bit of room in the middle—see the mediterranean diet, which is one of, if not the most universally lauded diets ever studied. Its defining feature is probably the generous use of olive oil and omega 3's in the meat—two things entirely consistent with our theory here. I don't see why we should write this off on the intricacies of saturated fats vs PUFAs when the overall body of evidence is scant to begin with—and our primary focus, zoomed out, is in my opinion the question of new vegetable oils, which have other factors inherent to them.

My main point in this entire essay is not that PUFAs are bad per se, it's that these new vegetable oils are probably bad. I think Scott would agree, we have nearly the same takeaway, but the reason I'm addressing him is because everyone who read that seemed to come away with the impression that this was a dead end.

>I think the most likely dietary change I make is to try to avoid foods with soybean, corn, or safflower oil, since this is probably a good stand-in for “foods processed enough that they count as processed foods and you should avoid them”.

Alright, so what did we learn here? Vegetable oil is a new, highly processed addition to our diets in the industrialized world, and stands to potentially explain a lot of the quandaries that continue to baffle us about the crisis of modern health. It's in damn near

everything, we get 20% of our calories from it, up from near 0%, and for some reason, no one seems to mind that and we all just argue about carbs and stuff. People haven't provably applied this theory to lose weight, but also no one seems to be trying. I don't see why it shouldn't be our prime suspect, however we don't seem to know the causal reason for why this may be from quality human studies, although the Nobbs piece and its associated sources put forth plenty of possibilities to choose from.

I don't know for sure what the answer is, any implication that I did was simply so I didn't have to qualify every single statement. I'm largely just trying to get the conversation going, and I'm by no means an expert.

For giggles: conditional on us solving the obesity crisis by finding one primary cause, I'd give the addition of vegetable oils 45% likelihood of being that cause. If we're in an essentially multi-factor scenario, I think it still has a large role to play, based off of what I've seen so far. I definitely would like to know more about the gears of the science here, and I'd like to hear some good rebuttals to this as well, I didn't find many that I found required addressing in this initial post, but that's mainly because this is only on the radar of people screaming into the void.

I'd like to express my gratitude to everyone who reads this blog, and to all the sources I cited. Without exception they were fascinating and well written. We're all in this together, trying to figure out just what in the world is going on here.



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