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Is organic food healthier? Many scientists are still skeptical.

by Brad Plumer • 8 min read • [original](#)

You've no doubt noticed that organic foods usually cost more at the supermarket. An organic head of lettuce might cost twice as much as a regular one. But is it actually any healthier?

Many scientists have found no clear health benefits from organic produce

In recent years, many scientists have said "probably not." With a few small exceptions here and there, the nutritional differences seem to be pretty minimal.

Back in 2009, the United Kingdom's Food Standards Agency [reviewed](#) 67 studies on this topic and couldn't find much difference in nutrient quality. In 2012, a [larger review](#) of 237 studies published in the *Annals of Internal Medicine* also found that organic food didn't appear to be any healthier or safer than their conventionally grown counterparts.

Yet there have long been dissenters who argue that there must be *some* health benefits to organic food. And [a new study](#) in the *British Journal of Nutrition*, led by Carlo Leifert of Newcastle University, has rekindled this debate by adding a small twist. Their review of 347 previous studies found that certain organic fruits and vegetables had higher levels of antioxidants than conventionally grown crops.

Still, that doesn't prove much by itself. No one knows if those moderately higher levels of antioxidants actually boost your health. For that to happen, they'd have to be absorbed into your bloodstream and distributed to the right organs — and there just hasn't been much good research showing that. For now, those health benefits remain unproven.

In the meantime, some experts have suggested that this never-ending debate has become a bit of a distraction. Marion Nestle of New York University [argues](#) that the main reason to pay more for organic produce is for the environmental

impacts and production values. Fewer antibiotics, fewer pesticides. That sort of thing. Any nutritional benefit is a "bonus," if there even is one.

Other food experts point out that most Americans don't eat enough fruits or vegetables of *any* type — and that's a more pressing concern than whatever small differences may exist between organic and conventional food. "What's missing in this debate is the important fact that the best thing consumers can do is to eat lots of fruits and vegetables, period, regardless of whether they are produced organically or conventionally," says Carl Winter of the University of California, Davis. (He's also skeptical, by the way, that organic food is any healthier for you.)

So here's an overview of the debate over this contentious topic:

It's not easy to compare organic and conventional foods



Organic farm in Yakima, Washington. [sagebrush photography/Flickr](#)

One big obstacle for anyone trying to compare "conventional" and "organic" foods is that these are incredibly broad terms.

In the United States, there's technically a dividing line between the two: farms certified as "organic" by the USDA **are prohibited** from using synthetic pesticides, petroleum-based fertilizers, or sewage sludge. Organic animals can't

be fed antibiotics or growth hormones.

CONVENTIONAL AND ORGANIC PRACTICES CAN VARY WIDELY

But that still leaves a *lot* of room for variation. Some conventional farms go heavy on the synthetic fertilizer and pesticides. But others spray more selectively or use [alternative pest management techniques](#).

Likewise, some organic farms use natural pesticides that are considered "organic" but can nonetheless [be quite toxic](#). And some organic farms use compost that [can contain more](#) contaminants like lead or cadmium than regular fertilizer. It all depends — there's no single "conventional" farming system or single "organic" system.

What's more, there a vast array of different variables that can affect the nutritional value of crops — from soil type to climate conditions to the crop cultivars being planted. Teasing all those variables out in order to make a grand statement about "organic" versus "conventional" farming is incredibly difficult.

Still, that hasn't stopped scientists from trying. So far, however, they've had a tough time finding clear nutritional differences. One 2013 [study](#) found that organic tomatoes have more vitamin C, but they're also smaller, so the differences are fairly minimal. Another 2013 [study](#) found that organic milk in the US contained more omega 3s — although this may be driven more by the types of feed used rather than being a unique property of "organic" farming.

More recently, researchers [have been conducting](#) large meta-analyses — studies of studies — to try and pinpoint some big picture lessons here. To date, those reviews have usually found that there's little nutritional difference between organic and conventional produce. (See [here](#) and [here](#).) But now comes a new study with a slight dissent...

A new study claims possible benefits for organic produce...



John Williamson holds a handful of flax seed December 13, 2012 on his 200-acre organic farm in North Bennington, Vermont. Robert Nickelsberg/Getty Images.

In the latest [meta-analysis](#), Leifert and his colleagues reviewed 347 studies comparing organic and conventional produce around the world. They concluded that organic fruits and vegetables had, on average, higher levels of antioxidants and lower levels of synthetic pesticide residue.

It's not clear whether higher levels of antioxidants translate to better health

What's not clear, however, is whether these differences have any actual health impact on human beings. And there have been a few sharp criticisms of the study. Let's take a closer look at the paper's findings:

1) Organic produce, on average, had higher levels of antioxidants. This is the part of the study that got the most attention from the media. On average, the authors found, organic produce had higher levels of flavonoids, phenolic acids, anthocyanins, and carotenoids — in some cases, 20 to 40 percent higher.

These compounds — referred to as "antioxidants" — are essentially plant defenses, produced when the plants are stressed by their environment. So [one possibility](#) is that organic crops create more of them since they're not protected

by chemical pesticides and have to deal with more pests.

But there's a catch: We don't really know whether these compounds boost people's health. We don't know how many of these extra antioxidants are actually absorbed by humans. We don't know what the optimal level of antioxidant intake actually is. It's true that some studies have shown that a diet rich in fruits and vegetables [can protect against](#) disease. But those studies looked at people mostly eating conventionally grown vegetables — and the precise role of antioxidants [is still being debated](#).

The University of Washington's Charles Benbrook, a co-author of the new study, [noted this point](#) in a blog post: "Our team, and indeed all four reviews, acknowledges that many questions remain about the bioavailability of plant-based antioxidants, how necessary they are at different life stages, and how inadequate intakes shift the burden of disease." He added that there were some reasons to think those antioxidants are beneficial, but it's hard to say for sure.

2) Organic grains, on average, had 48 percent lower cadmium levels.

Cadmium is a heavy metal that is taken up by plants in the soil and harmful to humans in very high doses. So at first glance this seems relevant.

Yet it's hard to see why organic farming itself would lead to lower cadmium levels — this may just reflect differences in various soils. (Crops from some organic farms [can be](#) quite heavy in cadmium.) It's also not clear this is a pressing health concern. The EPA [says](#) the average American gets 0.0004 micrograms of cadmium per kilogram of body weight per day from food — ten times lower than levels that would cause kidney damage.

If you want to reduce your cadmium intake, quitting smoking and eating less shellfish are much more important steps to take.

3) Organic fruits and vegetables had less synthetic pesticide residue. This shouldn't be too surprising — synthetic pesticides aren't used on organic farms and the study didn't test for organic pesticides (which can themselves [be quite toxic](#)). Still, some experts are unconvinced that pesticide residue is a big problem either way.

Some Experts aren't convinced that differences in pesticide residue matter

"From my 27 years of research on pesticides and food safety, I remain skeptical that the extremely low levels of pesticide residues we encounter from foods have any impact on public health, and slightly lowering such levels even more would

not have any additional impact,” Carl Winter, a pesticide and risk assessment specialist at the University of California-Davis, wrote to me in an e-mail. “Our typical exposure to pesticide residues is at levels 10,000 to 10,000,000 times lower than doses that cause no observable effect in laboratory animals that are fed pesticides daily throughout their entire lifetimes.” ([Here’s](#) some of his research on that.)

(That said, anyone who’s worried [can wash their fruits and vegetables](#) in tap water and significantly reduce pesticide residue.)

4) Organic produce had lower levels of protein, fiber, and nitrates. This was another finding that didn’t get as much attention and might actually be a point in favor of conventional produce — as Tom Sanders, a nutritional scientist at King’s College London, [points out](#). That said, there’s still some debate over whether higher or lower levels of nitrates in vegetables are preferable.

Yet the organic study has also attracted some criticism



As with all big studies on a contentious topic, Leifort’s study also received a fair bit of criticism — you can see a roundup [here](#). A few points made:

Some experts argued that comparisons are inherently difficult

1) The health benefits of organic food are still unproven: "There is no evidence provided that the relatively modest differences in the levels of some of these compounds would have any consequences (good or bad) on public health," said Richard Mithen of the Institute for Food Research. He added this twist: "The additional cost of organic vegetables to the consumer and the likely reduced consumption would easily offset any marginal increase in nutritional properties, even if they did occur, which I doubt."

2) The analysis may have included too many low-quality studies. Alan Dangour — the scientist who led the 2009 review finding no significant differences in organic food — [argued](#) that Leifert likely included too many low-quality studies in his review. Leifert [shot back](#) that Dangour's own study *excluded* too many studies. This is often a point of contention when dealing with meta-analyses.

3) Comparisons between "organic" and "conventional" may be inherently flawed. And still other experts [reiterated the point](#) made above that it's difficult to compare "organic" to "conventional" farming because practices vary so widely. For instance: on average, cadmium levels may be lower in organically grown cereal crops. But some organic farms use compost that's extremely high in cadmium.

To make this even trickier, the Leifert review surveyed studies across the entire world — 70 percent of the studies were in Europe, with the rest in the United States, Canada, Brazil and Japan. There may well be regional variations within that average.

Is it time to put this debate aside?



The Greenfresh market, located in Renton Washington. I-5 Design and Manufacture/Flickr

Meanwhile, a few other commentators have suggested that the debate over whether organic or conventional food is healthier is becoming increasingly useless.

75% of americans don't eat enough fruits and vegetables — regardless of type

Back in 2009, food writer James McWilliams [pointed out](#) in *Slate* that only about 2.5 percent of food eaten in the United States is even organic — and the typical consumers tend to be college-educated and fairly well-off. That means we're quibbling over marginal nutritional differences (if any) for a population that's already fairly healthy.

By contrast, about [73 percent](#) of the US population doesn't eat the recommended five or more servings of fruits and vegetables each day. For many nutritionists, that's a much more pressing concern — fixing that would swamp any of the health benefits organic food might have.

Indeed, a few experts wonder if the endless debate over organic versus conventional might even be counterproductive: "I worry that some consumers might actually reduce their consumption of fruits and vegetables because of pesticide residue concerns," notes Winter, "which would do them more harm than good."

Even some proponents of organic food are now suggesting that the nutrition question is a bit of a sideshow. On her blog, Marion Nestle [argues](#) that the case for buying organic produce hinges more on how our food is produced and concern for the environment: "As I said, if they are more nutritious, it's a bonus, but there are plenty of other good reasons to prefer them."

She doesn't list those reasons, but proponents [often cite](#) things like less fertilizer runoff and pollution or fewer antibiotics being used in farms or less pesticide exposure for farmworkers.

Still, the *Guardian* [recently cited one survey](#) suggesting that at least 55 percent of organic buyers list "healthy eating" as a reason for purchasing. So it's unlikely this debate will go away anytime soon — and it'll remain of keen interest to a lot of people.

Further reading:

- [Here's](#) the study that kicked this debate off. Here's co-author Charles Benbrook's [blog post](#) explaining it. And [here are a list of responses](#) from the Science Media Centre, some positive, most negative.
- Here's [an in-depth review](#) of the *British Journal of Nutrition* study by Cornell doctoral candidate Kevin Klatt.
- For those who want to pick over different studies with a fine-tooth comb, Tamar Haspel [had a nice piece](#) looking at the evidence on a variety of fruits, vegetables, milk, and meat.
- Melinda Wenner Moyer [recently wrote](#) a long reported essay for *Slate* on why she felt fine feeding her kids conventional fruits and vegetables.
- [40 maps](#) that explain food in America

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