Climate change is making our favorite carbs less nutritious

Crops are losing protein and iron as the planet warms.

By MARLENE CIMONS NEXUS MEDIA AUGUST 3, 2017

We already know how prolonged drought, high heat and heavy rains prompted by climate change can wreak havoc on agriculture. But there is more disturbing news.

If we do nothing, growing levels of atmospheric carbon dioxide from emissions will seriously impair the nutritional value of wheat, rice and other staple crops, putting millions of people around the world in danger of protein deficiency, according to new research published in the journal in *Environmental Health Perspectives*.

"These findings are surprising," said Samuel S. Myers, senior research scientist in the department of environmental health at Harvard's T.H. Chan School of Public Health, who authored the study. "If we sat down together 15 years ago and tried to anticipate the human health impacts of anthropogenic CO_2 emissions, we would not have predicted that our food would become less nutritious. If we disrupt and transform most of the natural systems on our planet, we will continue to encounter surprises like this."

If CO_2 levels continue to rise as projected, the populations of 18 countries may lose more than 5 percent of their dietary protein by 2050, according to the study. An estimated 76 percent of the world's population derives most of its daily protein from plants. To calculate the current and future risk of protein deficiency, the researchers combined data from experiments in which crops were exposed to high concentrations of CO_2 with global dietary information and measures of income inequality.

The scientists found that under increased CO_2 concentrations, the protein content of rice, wheat, barley, and potatoes decreased by between 6 and 14 percent. The study—believed to be the first to quantify this risk—estimates that an additional 150 million people globally could suffer from this nutritional loss on top of the "hundreds of millions of people who already suffer protein deficiency, whose deficiencies will be exacerbated," Myers said.

A companion paper by Myers and his colleagues published in *GeoHealth* found similar CO_2-related reductions in iron content, which likely will worsen the already significant problem of iron deficiency worldwide. This could prove especially dire for children younger than 5 and an estimated 1 billion women of childbearing age. The study projects a loss of nearly 4 percent of dietary iron as a result of the CO_2 effects.

Collectively, these nutritional deficiencies “represent very high burdens of disease,” Myers said. “They kill people.” Protein deficiency can cause stunting and muscle wasting, low birth weight, developmental delays, weakness and fatigue, among other things. Iron deficiency results in higher rates of maternal and neonatal mortality, lower IQ and reduced work capacity.

Zinc deficiency—the subject of a 2015 paper also authored by Myers—can cause higher rates of mortality from infectious diseases in children due to its harmful effects on immune system functioning. That study predicted that elevated CO_2 emissions were likely to drive an estimated 200 million people into zinc deficiency.

The results of the most recent research suggest continuing challenges for sub-Saharan Africa, where millions already experience protein deficiency, and growing problems for South Asian countries, including India, where rice and wheat supply a large supply of daily protein. India may lose more than 5 percent of the protein found in its standard diet, putting a projected 53 million people at new risk of protein deficiency, according to the study.

“These findings highlight a major issue of equity,” Myers said. “The people who will be responsible for most of the [increasing] CO_2 emissions … are nearly mirror images of the people who will suffer. The wealthier world will emit the CO_2 that puts the poorest people with the least diverse diets in harm’s way.” Furthermore, “today’s population is degrading the health of future generations through our CO_2 emissions,” he added.

He acknowledged that the nutrition problems raised by the study could complicate growing calls by climate activists, scientists and others for people to adopt more plant-based diets as a way to reduce their carbon footprint and counteract emissions caused by raising beef animals for human consumption.

“There are clearly populations in lower income countries that would benefit from more animal source foods in their diets, not less,” Myers said. “This is even more true … because animal source foods tend to be rich in iron zinc and protein. For the wealthy parts of the world, most people get plenty of these nutrients, and would experience health benefits from reducing meat intake, particularly red meat. So the recommendations should depend on which populations we are talking about.”

North Americans tend to have sufficient dietary iron, zinc and protein, except for those on very specialized diets, he pointed out. “One interesting challenge, however, for wealthy world populations related to the protein declines, is that we know that substituting dietary carbohydrate for dietary protein causes an increase in risk for cardiovascular disease,” he said. Thus, “we could be slightly increasing the risk of heart disease for very large populations.”

If society is unwilling or unable to mitigate emissions, Myers believes there may be several ways to cope. At least one study has recommended that people include more beans in their diets as a substitute for beef. Another study suggested that humans try edible insects, specifically crickets and mealworms.

“Consumption of more pulses [beans, peas, lentils, chickpeas] would help with the protein deficiency because pulses are rich in protein and show less loss of protein in response to rising CO_2 than the grains,” Myers said. “In general, more dietary diversity and more animal source foods in lower-income populations with very low intake of animal source foods would help.

“Bio-fortification of crops with iron and zinc is possible, as is breeding crops that are less sensitive to these CO_2 effects,” he added. “In extreme cases, supplementation could be entertained, although that is complicated terrain and needs to be managed carefully."

Overall, the best approach is to carefully monitor the nutritional sufficiency of vulnerable populations, and find ways to encourage more diverse and nutrient rich diets, he said. “Of course, this has been true for decades, and we still have over a billion people suffering large burdens of disease from nutrient deficiencies, so it is easier said than done,” he added.

Marlene Cimons writes for Nexus Media, a syndicated newswire covering climate, energy, policy, art and culture.

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