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Nuclear war between two nations could spark global famine

A pall of smoke from burning cities would engulf Earth, causing worldwide crop failures, models show.

- Alexandra Witze

Many warehouses around the world would empty of crops such as wheat after a small nuclear war.Credit: Carla Gottgens/Bloomberg via Getty

Even a small conflict in which two nations unleash nuclear weapons on each other could lead to worldwide famine, new research suggests. Soot from burning cities

would encircle the planet and cool it by reflecting sunlight back into space. This in turn would cause global crop failures that — in a worst-case scenario — could put 5 billion people on the brink of death.

“A large percent of the people will be starving,” says Lili Xia, a climate scientist at Rutgers University in New Brunswick, New Jersey, who led the work. “It’s really bad.”

The research, published on 15 August in *Nature Food*[1], is the latest in a decades-long thought experiment about the global consequences of nuclear war. It seems especially relevant today as Russia’s war against Ukraine has disrupted global food supplies, underscoring the far-reaching impacts of a regional conflict.

Scenarios big and small

Nuclear war comes with a range of lethal impacts, from killing people directly in atomic blasts to the lingering effects of radiation and other environmental pollution. Xia and her colleagues wanted to look at the consequences farther afield from the scene of war, to explore how people all around the planet could also suffer.

How a small nuclear war would transform the entire planet

They modelled how climate would change in various parts of the world following a nuclear war, and how crops and fisheries would respond to those changes. The scientists analysed six war scenarios, each of which would put different amounts of soot into the atmosphere, and drop surface temperatures from anywhere between 1 and 16 °C. The effects could linger for a decade or more.

A nuclear war between India and Pakistan, perhaps triggered over the disputed Kashmir region, could loft between 5 million and 47 million tonnes of soot into the atmosphere, depending on how many warheads were deployed and cities destroyed. A full-out nuclear war between the United States and Russia could produce 150

million tonnes of soot. The globe-encircling pall would persist for years until the skies eventually cleared.

Using data from the United Nations' Food and Agriculture Organization, Xia's team calculated how declining crop yields and fishery catches after a nuclear war would affect the number of calories available for people to eat. The scientists studied several options, such as whether people continued to raise livestock or whether they routed some or all crops meant for livestock to humans instead. The study assumed there would be some repurposing of biofuel crops for human consumption, and people would cut back on or eliminate food waste. It also assumed that international trade would stop as countries chose to feed people within their own borders rather than exporting food.

Xia notes that the study relies on many assumptions and simplifications about how the complex global food system would respond to a nuclear war. But the numbers are stark. For even the smallest war scenario, of an India–Pakistan conflict that results in 5 million tonnes of soot, calorie production across the planet could drop by 7% in the first five years after the war. In a 47-million-tonnes-of-soot scenario, global average calories drop by up to 50%. In the worst case of a United States–Russia war, calorie production drops by 90% three to four years after the war.

‘Let’s move to Australia’

The nations most affected would be those at mid to high latitudes, which already have a short season for growing crops and which would cool more dramatically after a nuclear war than tropical regions would. The United Kingdom, for instance, would see sharper drops in food available than a country such as India that is located at lower latitudes. But France, which is a major exporter of food, would fare relatively well — at least in the lower-emission scenarios — because if trade were halted, it would have more food available for its own people.

Ukraine nuclear power plant attack: scientists assess the risks

Another less-affected nation is Australia. Isolated from trade in the wake of a nuclear war, Australia would rely mainly on wheat for food. And wheat would grow relatively well in the cooler climate induced by atmospheric soot. On the team's map showing large portions of the world coloured red, for starvation, Australia gleams an untouched green, even in the severe war scenarios. "The first time I showed my son the map, the first reaction he had is 'let's move to Australia,'" Xia says.

The study is a useful step towards understanding the global food impacts of a regional nuclear war, says Deepak Ray, a food-security researcher at the University of Minnesota in Saint Paul. But more work is needed to accurately simulate the complex mix of how crops are produced around the world, he says. For instance, the research took into consideration national crop production numbers, but reality is much more nuanced, with different crops being grown in different regions of a country for different purposes.

Nuclear war might seem less of a threat than it did during the cold war, but there are still nine countries with more than 12,000 nuclear warheads among them. Understanding the potential consequences of nuclear war in detail could help nations better assess the risks.

“It is rare to happen — but if it happens, it affects everyone,” Ray says. “These are dangerous things.”

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References

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