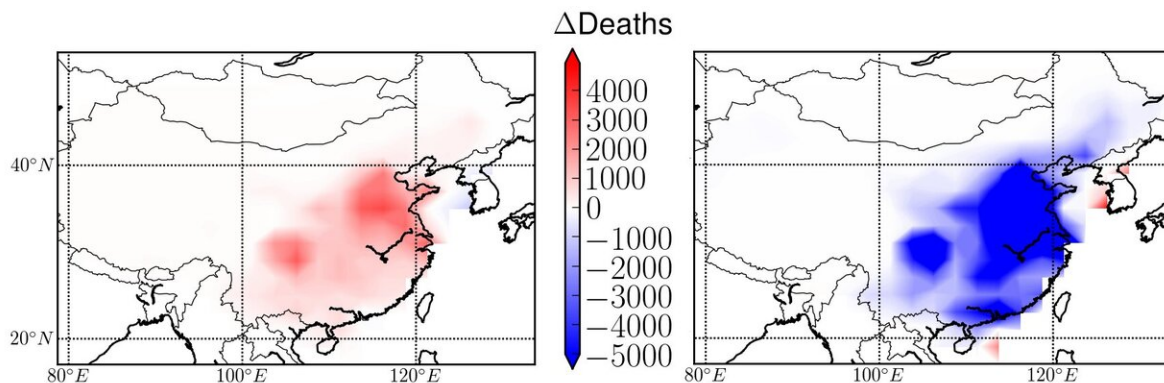


# By cutting ozone pollution now, China could save 330,000 lives by 2050

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Projected changes in China's premature deaths from ozone pollution, 2015-2050. Left, effects of a 'status quo' strategy, where climate change and rising pollution cause premature deaths to increase in urban areas. Right, how many lives could be spared if the government adopts an aggressive emissions-reduction strategy. Credit: Westervelt et al., 2019

If China takes strong measures to reduce its ozone pollution now, it could save hundreds of thousands of lives in the long run, according to a new study led by researchers at Columbia University's Lamont-Doherty Earth Observatory.

"Air pollution is a major problem in China right now," said lead author Daniel Westervelt, an associate research scientist at Lamont-Doherty. "It's a very serious health risk. So it's important to think about what

changes can be made to make progress on this problem."

High up in the atmosphere, the ozone layer protects our planet from harsh ultraviolet radiation. But when ozone gets into the air we breathe, it can lead to [premature death](#) from cardiovascular disease, stroke and respiratory problems. On-the-ground ozone pollution is created when other pollutants—nitrogen oxides and volatile organic compounds—react together with sunlight. Those pollutants can come from motor vehicles, [power plants](#), factories and other human-made sources.

Ozone pollution is already dangerously common in China, causing an estimated 67,000 premature deaths in 2015. But the new study, published today in Environmental Research Letters, finds that the situation could become quite a bit worse in the future. The researchers, based in both the United States and China, modeled how three different emissions scenarios for China would impact human health.

The first scenario looked at what would happen if China's air pollution levels stay fixed but the [climate](#) continues to warm. The second scenario looked at the [effects of climate change](#) plus a 10 percent increase in ozone pollution emissions—representing a 'status quo' strategy, according to Westervelt. And the third scenario analyzed the [impacts of climate change](#) plus an aggressive approach of cutting China's ozone-forming emissions by 60 percent.

Plugging those scenarios into a model of atmospheric chemistry and climate, the team found that climate change alone could cause a 11 percent increase in ozone pollution in China. This would cause an additional 62,000 premature deaths by 2050.

In the second scenario, a 10 percent increase in emissions of air pollutants combined with climate change caused an additional 80,000

premature deaths. On the other hand, a 60 percent decrease in ozone-forming emissions prevented 330,000 premature deaths.

In all three simulations, climate change made ozone [pollution](#) worse than it would have been otherwise. That wasn't surprising; scientists know that warmer temperatures will speed up the reactions that create ozone and enhance conditions that allow it to accumulate near the surface.

However, the study revealed another startling way that climate change could exacerbate [ozone pollution](#): "It turns out that a major portion of the ozone increase we're seeing in the model in western China originates in the stratosphere," said Westervelt.

It's normal for some ozone to trickle down from the [ozone layer](#) to the ground, but the model showed that by changing the jetstream and mixing patterns of the atmosphere, climate change could enhance the flow of ozone from the stratosphere to the surface, particularly over western China and the Tibetan plateau.

The team also calculated that emissions from other countries, including India, could significantly detract from China's air quality gains if it does decide to reduce emissions. The authors write that China would benefit by encouraging emissions reductions throughout all of Asia. "If China is able to be a leader on this and say, 'We need to reduce our emissions,' other countries may follow suit," Westervelt suggested.

The study shows that China is at an important crossroads, with its future air quality depending strongly on passing policies to reduce both ozone- and climate change-causing emissions, said Westervelt. "The issues of [climate change](#) and air quality go hand-in-hand, so it makes sense to tackle both things simultaneously."

To be sure, cutting [ozone](#)-causing emissions by 60 percent wouldn't come easy. It would require many new policies to fall into place, such as

increasing fuel efficiency standards, switching to electric vehicles, installing [air pollution](#) control devices on power plant smokestacks, and switching to cleaner sources of energy, such as natural gas and renewables. Nevertheless, the 60 percent reduction is feasible based on policy measures and technologies that already exist today, said Westervelt.

"I would hope that policymakers in China will take results like this and see that if you were to aggressively reduce emissions, you would reap the benefits in a pretty significant way," he said. "It's worth it to address these emissions now, so that you don't have to deal with all the health problems in the future. You could save 330,000 over the next few decades. That's a lot of lives."

Provided by Columbia University

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