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How Do You Fight The World's 'Largest Environmental Health Problem'? Harness The Sun.

More than 4 million people die prematurely every year from household air pollution -- largely a result of cooking with smoky stoves.

01/04/2016 04:38 pm ET

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AJAY PILLARISETTI

An Indian woman cooks over a traditional stove using wood and cow dung as fuel.

Cooking with energy from the sun -- a technique featured last month in an episode of "Top Chef" -- could soon put a major dent in what some experts call the world's greatest environmental health issue.

Every day, nearly half the people in the world prepare their meals over burning wood, charcoal or animal dung. And every year, more than 4 million people -- most of them women and children -- die prematurely from the resulting household smoke. The practice also contributes to deforestation and climate change.

"This is a big problem, bigger than outdoor air pollution or dirty water," said Kirk Smith, an expert in health and climate effects of household energy at the University of California, Berkeley, School of Public Health.

But the issue has remained widely overlooked -- until now.

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ONE EARTH DESIGNS

Nomads cook over a yak-dung fire in Qinghai, China.

It was sometime in 2007 or 2008 when Catlin Powers -- now CEO of One Earth Designs, whose solar stove was featured in the "Top Chef" episode -- happened upon the issue herself. Powers was studying climate change in the Himalayas, and one day, a curious nomadic family asked her what she was doing. When she tried to explain, in broken Tibetan, that she was "studying smoke in the sky," they laughed. What a ridiculous thing to do, they said, when the sky was blue yet their home was filled with smoke.

Sure enough, Powers' team detected a level of pollution inside the family's home that was 20 times as great as Beijing's air at the time. (It would be three or four times as dirty as [Beijing's notoriously bad air today.](#))

A typical wood-burning stove might produce 400 cigarettes' worth of smoke every hour, says Smith. In high-altitude regions, such as the Himalayas and Andes, lower oxygen levels mean that fires burn even dirtier. Women and children tend to inhale most of the toxic particles.

In addition to the direct health effects -- among them heart and lung problems, and even suppressed IQs -- the practice of cooking food over fire often means that women and children lose opportunities to work or to go to school. Many young girls forgo an education to help collect the wood used for their families' meals. Some families pay for their children's education in wood -- and it's usually the boys who go to school, while the girls gather the fuel to finance it.



ONE EARTH DESIGNS

Rural women in the Himalayas carry wood bundles home over snowy pathways.

Put all these consequences together and you have a "situation where nations already impoverished are having an even harder time pulling themselves out of poverty," said Powers, who is also the program leader for the Center for Health and the Global Environment at Harvard.

After her initial encounter with the Himalayan family, Powers began working with local women in efforts to improve the efficiency of traditional solid fuel cookers. They made progress, but the cleanest biomass stoves remained dangerously dirty. Hence, the inspiration for the [SolSource](#) solar stove, a smoke-free cooking apparatus that collects and concentrates sunlight at 92 percent efficiency. One Earth Designs brought the SolSource to market in 2013. So far, it's sold more than 4,000 units in 60 countries.

"Instead of trying to make the available clean, we can try to make clean available," said Smith.



ONE EARTH DESIGNS

SolSource boils water for Tsampa, a staple food, in Tibet.

It turns out that in many of the places where dirty cooking is most common -- Asia, Africa, Central America -- sunlight is also abundant. "There is no shortage of energy," Smith said.

There's still one obvious problem: The sun doesn't shine all day. Most solar cookers today, including SolSource, only work under direct sunlight. During much of the year, the sun is not even up when breakfast or dinner need to be cooked.

Powers expects her company to release an energy-storage battery with greater than 80 percent efficiency sometime this year -- a development she hopes will help meet that need. Other companies, such as [GoSun](#), [Solavore](#) and [Sun Oven](#), are also working to improve the power and practicality of solar-cooking products, which have been around for decades but are only recently gaining widespread adoption. Smith pointed to pending prizes for the development of photovoltaic-powered cook stoves that can store energy for use after dark. Meanwhile, the United Nations now hosts a public-private partnership called the [Global Alliance for Clean Cookstoves](#), which is aiming to get 100 million households worldwide to cook cleanly by 2020.



ONE EARTH DESIGNS

Maasai women test out cooking local cuisine on SolSource in Merrueshi, Kenya, with solar cooking trainers from the Masai Association.

A mix of solutions is key to tackling "the single largest environmental health problem in the world," according to Smith. While solar cooking is probably the most viable option in remote regions, other promising approaches could at least provide a bridge between dirty fuel and clean energy-based cooking elsewhere. In parts of India, for example, where 170 million households continue to cook with solid fuel, middle-class citizens are now donating their \$50 gas subsidies to poorer households so they too can tap the cleaner fuel source.

Whether or not the donors realize it, their generosity could improve the air they themselves breathe. Research has found that about half the outdoor air pollution in India comes from inside households, noted Smith.

"You can't clean up outdoor air unless you clean up indoor air, too," he said.

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