

Q&A with Paul Epstein, MD, and Dan Ferber, the authors of *Changing Planet, Changing Health*.

Climate change is sometimes portrayed as a victimless crime, but it's not. In 2005, the World Health Organization found that climate change was already causing 150,000 deaths and 5 million illnesses a year. The American Medical Association, American Academy of Pediatrics, and many other medical groups are issuing urgent warnings. *The Lancet*, the leading international medical journal, stated flatly that "climate change is the biggest global health threat of the 21st century." Here's why.

Question: In what ways do these changes harm our health?

Answer: In five main ways — so far.

1. **Heat waves** kill 1500 people a year in the United States from heat stroke, heart attacks, and other maladies—more than hurricanes, tornadoes, earthquakes and floods combined. If we keep burning fossil fuels at current rates, they'll be much more common. Climate models project a blistering heat wave like the one that killed 739 people in Chicago in 1995 every summer, on average, by the 2040s.

2. **Infectious diseases carried by insects and other cold-blooded animals are moving northward and higher into the mountains, bringing tropical diseases to areas that were once disease-free.** Malaria has moved into East African highlands areas that were once refuges, threatening the lives of millions. Dengue fever, a tropical disease that causes intense pain and can cause lethal internal bleeding, has moved north through Mexico, and health officials worry that it will move into Texas and other southern states. Ticks that transmit Lyme disease have spread north through New England, increasing 8-fold in New Hampshire and 10-fold in Maine in the past decade alone.

3. Heat and air pollution worsen **asthma, allergies, and other lung disease**. Burning coal, oil, and gas to generate electricity and power vehicles produces air pollution. Rising carbon dioxide emissions and warming cause ragweed to produce more—and more potent—pollen. Nitrogen oxide (NOx) gases from tailpipes react in the air with other pollutants to form ground-level

ozone—the active ingredient of smog—which corrodes the lining of the lungs. Soot from diesel-burning trucks and buses infiltrate tiny airways deep in the lung, sometimes carrying ragweed pollen. In all these ways, burning fossil fuels worsens allergies and asthma, especially in polluted cities.

4. **Extreme weather** harms and kills. Downpours of more than six inches in a day have become 27 percent more common in the United States since 1970. They can cause devastating floods, as in Cedar Rapids in 2008, and in Nashville and Pakistan in 2010. Severe floods can kill or injure people, and lingering floodwaters often breed epidemics of diarrheal, respiratory, mosquito-borne disease and rodent-borne disease, especially in poor areas. Ice storms and blizzards can injure or kill people from falls, car crashes, heart attacks from shoveling snow.

5. **Diseases of trees** threaten health by polluting the air; **crop diseases** threaten supplies of healthy food. Bark beetles have turned forests in the West into tinder, aided by a warmer, drier climate. The result: larger and longer-burning forest fires that kill people directly and produce smoke that aggravates bronchitis and asthma, and raise the risk of heart attacks. Crop diseases and insect infestations can spell malnutrition or even famine. Research at the University of Illinois shows how soybeans suffer more insect damage elevated carbon dioxide levels expected by 2050. Each degree of warming is predicted to cut world grain production by 10 percent.

Question: What are the biggest long-term worries?

Answer: Climate change is making dry areas dryer, and **drought, combined with melting mountain glaciers**, threatens already scarce supplies of drinking and irrigation water. Drought can cause famines that kill hundreds of thousands, as in sub-Saharan Africa in the early 1980s. Drought worsened by climate change has already cut crop yields in Ethiopia, and the area is being monitored closely for signs of famine. Climate could also cross a tipping point, as it has often over the eons. A little-known Pentagon planning scenario concluded that such an event could lead to global economic depression, widespread crop failures, mass migration, and war.

Question: Which climate change solutions give us the biggest bang for the buck?

Answer: We need a smart electrical grid that will increase efficiency, reduce demand and use renewable sources like wind and solar. We also must carefully choose energy sources to preserve human health and nature, which we depend on. The winners here are wind, concentrated solar, geothermal, tidal, solar photovoltaics, wave, hydroelectric. The losers are nuclear, coal, even with carbon capture and storage, and corn-based ethanol.

These choices are based on extensive studies called life cycle analyses that take every step of a technology and its effects into account—not just what consumers pay, but also effects on human health, wildlife, and the environment. We also need to rejigger the international financial system to encourage countries to invest in measures that protect their environment and the health of their citizens. To promote good health in the 21st century, we need to become resilient and adaptable.

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