Editorials

Climate Change: What the Science Tells Us

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To understand the extraordinary urgency of what some call the climate crisis[1] and its relevance to physicians, we must pull back the lens to understand warming trends and their impact on not only health, but the very foundations of human survival.

A recent study[2] reinforces the consensus[3,4] that global warming exists and is predominantly due to human activity. The authors found that over the past 2,000 years the warmest period occurred in the 20th century.[2] In fact, 80% of the warming since pre-industrial times has occurred since the 1970s.[5] Experts project that even if all countries met the carbon dioxide emission targets set by the 2015 Paris Agreement, the Earth's temperature would still increase 3.2°C (5.8°F) by 2100.[5]

A recent United Nations report found serious outcomes at about half of this temperature increase (1.5°C [2.7°F])—the low-end aim of the Paris Agreement—with dramatically worse outcomes at an increase of a mere 0.5°C more (2.0°C [3.6°F]).[6] A 1.5°C increase, which may occur by 2030 if the current rate of warming continues, is predicted to cause a massive (70% to 90%) die-off of coral reefs and plummeting catches of fish and shellfish, a nutritional staple for many populations.[6] In southeast Florida alone, reef economies (e.g., dive trips, fishing) generate $324 million annually and support more than 70,000 jobs.[7] With a 2.0°C temperature increase, reefs are predicted to essentially disappear,[6] causing beach erosion and costly coastal flooding. With a 1.5°C increase, Arctic sea ice will remain during most summers; however, ice-free summers are 20 times more likely with a 2.0°C increase.[6] By 2050, the southeast United States is expected to experience an extra 40 to 50 days annually of temperatures exceeding 32.2°C (90°F).[8]

Self-perpetuating feedback will increase, such as melting permafrost, which can cause land collapse and widespread lake formation with rapid thawing beneath, releasing huge stores of methane, a gas 33 times more potent at warming than carbon dioxide. With the loss of Arctic ice to reflect heat, dark oceans and land absorb more heat, which melts more ice and accelerates warming. It is plausible that a cascade of feedback triggered at a 2°C temperature increase will make global heating not only irreversible, but orders of magnitude worse.[9]

Carbon dioxide levels have increased from 280 ppm before the Industrial Revolution to a current level of 415 ppm, and the rate of increase is accelerating.[10] With the current level of progress in reducing carbon emissions, even the most modest goals are unlikely to be met, as total annual greenhouse gas emissions continue their unabated rise.[11] Total annual greenhouse gases emissions, including from land-use changes, reached a record high in 2017.[11] Unless emissions are reduced to 55% of 2017 levels by 2030, global temperatures will exceed the limits needed to slow climate impacts, such as extreme weather events, food insecurity, migration of displaced people, and disruption of ecosystems.[11] The sounds of alarm increasingly manifested across multiple sectors around the globe are warranted, and the science shows why.

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Author disclosure: No relevant financial affiliations.

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