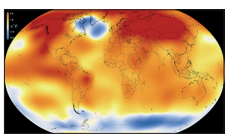
Climate change: fires, floods, and infectious diseases



Scientific Visualization Studio/Goddard Space Flight Center

Against a backdrop of devastating wildfires and floods across the world and the hottest July on record, on Aug 9, the Intergovernmental Panel on Climate Change (IPCC) published Working Group I's contribution to its Sixth Assessment Report, Climate Change 2021. This document focuses on the physical science basis of climate change and is the starkest yet to be released by IPCC, stating the unequivocal contribution of humans to the warming of the planet.

As per the report, rising global temperatures have driven "widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere". The breadth of the implications on human and natural systems will be explored in the 2022 Working Group II's contribution to the report. However, after almost 2 years of global focus on the COVID-19 pandemic, this first volume comes as a severe reminder that other major global crises are ongoing and require immediate action.

Among the wide-ranging effects of climate change on health, infectious diseases are not spared. Climatic conditions are becoming increasingly suitable for the transmission of multiple infectious diseases, by directly affecting biological features of pathogens (eg, growth, survival, and virulence) and their vectors, and by indirectly favouring transmission through the modification of ecosystems and changes in human behaviour.

Rising temperatures and increased precipitation can promote an array of infectious diseases, from vector-borne diseases (eg, malaria, dengue, and leishmaniasis), to enteric infections and diarrhoea (eg, cholera, vibriosis, and rotavirus infection), and to parasitic diseases such as schistosomiasis. Climate-related suitability for dengue transmission in 2018 had globally increased since 1950 by an estimated 8·9%, when considering *Aedes aegypti*, and by 15·0%, when considering *Aedes albopictus*. This increase is partly due to the broadened geographical reach of these vectors—eg, several *Aedes* spp, absent from Europe before 1990, have become established in several European countries. Other vectors, such as *Ixodes ricinus* ticks, carriers of *Borrelia burgdorferi* (causing Lyme disease) and tick-borne encephalitis virus, have also gradually spread to wider regions in Europe. In the past 10 years, Europe has seen a return of malaria, with sustained local transmission of *Plasmodium vivax* infections in Greece in 2012, increased incidence of pathogenic *Vibrio* spp infections in the Baltic region, recurring summer outbreaks of West Nile virus in southern and eastern Europe, cases of local transmission of chikungunya in France and Italy, and a report of local transmission of Zika virus in France in 2019.

The multitude and complexity of factors that influence transmission patterns prevent accurate predictions of the effects of climate change on infectious diseases. But the devastating global consequences of the COVID-19 pandemic on health, health systems, and economies should caution governments, policy makers, and the general public to not underestimate the threat of climate-related changes to infectious disease geographical distribution and burden.

The upcoming 26th UN Climate Change Conference of the Parties (COP26) represents a unique opportunity for participating nations to reinforce the commitments made in the 2015 Paris Agreement "to limit global warming to well below 2°C" and "to achieve a climate neutral world by mid-century". The IPCC 2021 report offers some space for cautious optimism, by including a very low greenhouse gas emission scenario that predicts a temperature rise of 1·0–1·8°C by 2100 (*vs* 1850–1900), but achieving this scenario will require immediate and major policy changes.

When thinking specifically of infectious diseases, curbing greenhouse gas emissions is only one crucial issue. The COVID-19 pandemic has stimulated numerous pandemic preparedness initiatives, primarily focused on the potential emergence of novel pathogens. Such initiatives might do well to broaden their scope to include surveillance of existing infectious diseases and their changing transmission trends in response to evolving climatic conditions. Much research has been done on the impact of climate on health, but little research has been dedicated to mitigation or adaptation measures. The global research community, policy makers, and funders must come together to identify and implement such measures—including strengthening health systems and preparedness—with the primary goal of protecting vulnerable populations, on whom any effects of climate-related changes in infectious disease transmission will be exacerbated by compounding factors such as pre-existing health conditions and low socioeconomic status.

■ *The Lancet Microbe*

For **IPCC's Sixth Assessment Report** see https://www.ipcc.ch/report/ar6/wg1/#outreach

For more on **effects of climate change on health** see **Review** *Lancet* 2021; **387:** 129–70

For more on **infectious diseases and climate change** see https://www.ipcc.ch/report/ar5/wg2/

For more on **increased geographical reach of vectors** see **Review** *Lancet Infect Dis* 2015; **15:** 721–30

For more on **transmission of West Nile virus, chikungunya, and Zika virus in Europe** see *Lancet Reg Health Eur* 2021; **1:** 100017

For **COP26** see https://ukcop26.org/

For more on **research on climate and health** see **Articles** *Lancet Planet Health* 2021; **5:** e514–25