



## Climate Change and Emerging Infectious Diseases: How Many Epidemics Do We Need to Realize Its Implications?

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Climate change is occurring as a result of an imbalance between incoming and outgoing radiation in the atmosphere.[1] The present climate period is known as the Holocene which is remarkable for its stability as temperature changes have largely remained within a range of 2–3°C. This stability has facilitated the successful population and cultivation of most of the landmass by humans. Current climate change is different from that in the past because its primary cause is human activities and also its pace is faster than before. Due to alteration in the hydrologic cycle as a result of rising temperature, some geographic areas will have more rainfall while some more drought and severe weather events including heatwaves and storms are expected to become more common globally. For these reasons, the term “climate change” is now preferred over the term “global warming.”

A warmer climate could cause water-borne diseases to become more frequent, including cholera and diarrhoeal diseases such as giardiasis, salmonellosis, and cryptosporidiosis. [2] An example is the 1993 epidemic of diarrheal disease due to cryptosporidium in Milwaukee after heavy spring rains. [3] It is estimated that one-quarter of childhood deaths in South Asia are due to diarrhoeal diseases. [4] Diarrhoeal diseases are largely attributable to unsafe drinking water and lack of basic sanitation; thus, reductions in the availability of fresh water are likely to increase the incidence of such diseases. [5] Climate change will exacerbate the lack of available freshwater as annual mean rainfall decreases in many areas. As rising ambient temperatures increase, bacterial survival time and proliferation and thus

the incidence of diarrhoeal diseases might further increase. [6] A relationship has been observed between an increase in sea-surface temperature and the onset of cholera epidemics, with the cholera outbreaks following the seasonal rise and fall in sea-surface height and temperature. [7] Increases in cholera bacterial populations associated with plankton blooms in spring and summer have been noted off the coasts of several Latin American countries and in Bangladesh. [7]

Insect vectors tend to be more active at higher temperatures. Tropical mosquitoes such as anopheles species, responsible for malaria, require temperatures above 16°C to complete their life cycles. [8] Malaria can also be termed a water-vector disease as mosquitoes typically thrive in aquatic habitats. Thus, epidemics of malaria are common during rainy seasons in the tropics. In contrast, epidemics of mosquito-borne West Nile virus infection can occur during times of drought. This happens as a result of proximity between mosquitoes and birds (primary host of the virus) in inadequate water supply leading to accentuated transmissibility of the virus. In addition to this, as wetlands dry up, the populations of the natural predators of mosquitoes are greatly reduced during times of drought. There are some widely cited examples suggesting that climate change has already resulted in the introduction of certain infectious diseases into previously unaffected geographic areas. One such example is the spread of malaria into highland regions of East Africa, where this disease previously did not exist.[8] This spread occurred in the setting of weather that was much warmer and wetter than usual resulting in high rates of illness and death.

The WHO in one of its reports estimates of the future global burden of disease that will result from climate change. [9] It is predicted that by 2030, climate change will lead to an increase in diarrheal diseases by 10% and this would primarily impact the health of young children. Therefore, it becomes important to channelize our efforts to alleviate the effects of climate change and its potential impact on the global burden of infectious diseases. However, if there was any doubt about the disruptive potential of emerging infectious diseases, the COVID-19 pandemic has emphasized its potential to create chaos worldwide.

More research to understand the ecology and epidemiology of infectious diseases that will probably be affected by climate change is the need of the hour. The best modality to accomplish this would be to incorporate research on the effect of climate change into existing infrastructures and the development of early warning systems to help populations prepare for impending epidemics.

### **References:**

- 1.Pachauri RK, Reisinger A, eds. "Climate change 2007: synthesis report — contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change". Geneva: IPCC, 2007

- 2.Hales S, Edwards SJ, Kovats RS. Impacts on health of climate extremes. In: McMichael AJ, Campbell-Lendrum DH, Corvalan CF, Ebi KL, Githeko A, Scheraga JD, Woodward A, editors. "Climate change and human health: Risks and responses". Geneva, Switzerland: World Health Organization; 2003. pp. 79–102.
- 3.Mac Kenzie WR, Hoxie NJ, Proctor ME, et al. "A massive outbreak in Milwaukee of cryptosporidium infection transmitted through the public water supply". N Engl J Med 1994;331:161-167[Erratum, N Engl J Med 1994;331:1035.]
- 4.Zaidi AKM, Awasthi S, deSilva HJ. "Burden of infectious diseases in South Asia". BMJ. 2004;328:811–5.
- 5.Ezzati M, Lopez A, Rodgers A, Murray C, editors. 1 and 2. Geneva: World Health Organization; 2004. "Comparative quantification of health risks: Global and regional burden of disease due to selected major risk factors".
- 6.Checkley W, Epstein LD, Gilman RH, Figueroa D, Cama RI, Patz JA, et al. "Effects of El Nino and ambient temperature on hospital admissions for diarrheal diseases in Peruvian children". Lancet. 2000;355:442–50.
- 7.Lipp E, Huq A, Colwell R. "Effects of global climate on infectious disease: the cholera model". Clin Microbiol Rev. 2002;15:757–70.
- 8.Lafferty KD. "The ecology of climate change and infectious diseases". Ecology 2009; 90:888-900
- 9.Climate change and human health. Geneva: World Health Organization, 2009. (Accessed March 4, 2010, at <http://www.who.int/globalchange/en>. opens in new tab.)