Climate change hastens viral spread?

Humankind has caused or exacerbated the climate change catastrophe in our biosphere. We are already witnessing the adverse impacts of changing climate, including extinction of several plant and animal species, depletion of ozone layer, increasing air pollution, rising sea levels, etc. It is now well established that the climate is changing much faster in recent decades than in the past. The changing climate is now believed and shown to impact humans in a different way – increase in the frequency and variety of pandemic-like infections. There are at least 10,000 viruses globally that may infect people, but the vast majority of them exist outside human habitations. Even as fears about the COVID-19 pandemic wane (perhaps prematurely) across many regions of the world, an international research team from Georgetown University, US, explains the link between climate change and viral transmission. This study is the first comprehensive evaluation of how climate change would reconfigure the global mammalian virome.

As temperatures rise, many species are anticipated to migrate away from the scorching Equator in search of more suitable environments. Others may climb the slopes of hills and mountains in search of cooler heights. When viruses from various species first come into contact, they may be able to infect new hosts. To better assess the chances of a novel infection spreading, the researchers began by compiling a database of viruses and their mammalian hosts. Some viruses have been found in multiple species of animals, implying that they crossed the species barrier at some point in the past. Using a computational process known as machine learning, the scientists developed a model that could predict if two host species shared a virus. The researchers discovered that the greater the geographical overlap between two species, the more likely they were to share a virus. Because the hosts were more likely to come into contact with each other, their viruses had more opportunity to spread amongst them. They also observed that closely related animals were more likely than distant relatives to share a virus. They also discovered that closely related animals were more likely than distant relatives to share a virus. This is most likely owing to the comparable biochemistry of closely related mammals. A virus that has evolved to exploit one species is more likely to thrive in a related species. It may also be able to avoid detection by an immune system to which it is already accustomed.

The researchers anticipate that if the Earth's temperature continues to rise, wild animals will be compelled to migrate from their habitats, most likely to human habitats, significantly raising the danger of a viral leap to humans, which might lead to the next pandemic. In scientific terms, such an event when a virus from one species jumps into another species for the first time is called a 'spillover'. According to the researchers, the number of such species whose habitats will shift due to climate change is anticipated to reach 3,139, potentially driving spillover occurrences 4,000 times. These shifts provide more opportunities for viruses such as Ebola or coronaviruses to originate in new places, making them harder to detect and in new sorts of animals, making it simpler for viruses to pass beyond a 'stepping stone' species into humans.

The closest example is the risks associated with the wildlife trade. We must be concerned about markets because combining unwell animals in unnatural combinations provides chances for this stepwise process of emergence. As we have seen with SARS-CoV-2, this might have fatal implications. The virus was initially transmitted from animals to people at a seafood market in Wuhan, China; the increasing danger of such transmission with future infections might result in more and greater pandemics. It is also comparable to how SARS went from bats to civets and eventually to people. However, markets are no longer unique; in a changing environment, this form of activity will be the norm nearly everywhere in nature. Much of this activity may already be happening in today's 1.2°C warmer world, and attempts to cut greenhouse gas emissions may not be enough to prevent these catastrophes.

Another significant result is the effect that warmer temperatures will have on bats, which are responsible for a great deal of new viral sharing. Because they can fly, they will be able to travel large distances, increasing the probability of spreading infections. Because of their critical role in viral emergence, the biggest repercussions are expected to be seen in Southeast Asia, a global hotspot of bat diversity. Such incidents will be problematic all over the planet. Bats are most probably the natural reservoirs for Ebola in Africa. Thirteen species could possibly carry the virus, and when they disseminate due to global warming, they will encounter over 3,700 additional animal species, resulting in nearly 100 spillovers. So far, the most severe Ebola outbreaks have happened in West Africa, but the illness may potentially become a major concern for the continent's eastern side within decades. Scientists warn that if viruses begin to hop across host species at alarming rates, the impacts on conservation and public health could be severe. This process adds another layer to how climate change may endanger human and animal health, and it is unsure how these new viruses will affect the species involved. However, many of them are likely to result in new conservation risks and the development of novel outbreaks in humans.

Overall, the study suggests that climate change will become the most significant upstream risk factor for disease onset, surpassing higher-profile concerns such as deforestation, wildlife trading and industrial agriculture. According to scientists, the approach is to combine animal illness observation with real-time studies of changes in the environment. For example, when a Brazilian free-tailed bat finds its way to Appalachia, scientists should be curious to learn about the viruses that accompany it. Trying to detect these host leaps in real-time is the only way to prevent this process from resulting in additional spillovers and pandemics. The face of disease will change as the world evolves, and this study adds to the growing body of data that the future decades will not just be hotter but also sicker.

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