



Letter to the Editor

The need to adopt planetary health approach in understanding the potential influence of climate change and biodiversity loss on zoonotic diseases outbreaks



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Zoonoses, which are diseases that are transmitted naturally from animals to humans, are one of the leading public health threats [1]. Globally, the World Health Organization estimated about 1 billion cases of illness and millions of death per annum from zoonoses, thus a public health concern to the human population [1]. Apparently, only a few existing scientific publications on zoonoses show that climate change and biodiversity loss have a part to play in the incidence and distributions of zoonotic diseases in the human population. Impact of climate change and biodiversity loss on zoonotic diseases which is evident by shifts in distribution and behavioral changes of vectors and animals' species contribute to the spread and emergence of zoonotic diseases [2]. Several studies allude to the fact that a common factor in the emergence of zoonotic disease outbreaks is their coincidence with climate change and biodiversity loss. Outbreaks of Chikungunya fever, West Nile fever, Hantavirus, Lyme disease, Lujo virus, and Ebola disease have been linked with climate change and biodiversity loss as shown in reviews by Rajan and colleagues, and Naicker respectively [2,3]. Therefore, understanding the potential effects of climate change and biodiversity loss on the spread of zoonotic diseases, as well as addressing the diverse threats to human health and well-being in today's world requires a 'planetary health' approach.

Emergence and re-emergence of zoonotic diseases are increasingly high as a result of human exploitation of earth's natural resources and ecosystems through anthropogenic activities that lead to land-use change (mining, deforestation, land conversion, bush burning) and agricultural practices to respond to the rising human population's increasing needs for animal-derived foods and energy—are the main drivers of climate change and biodiversity loss, thus posing a risk to the human population [4]. Consequently, the 15th edition of the 2020 Global Risks Report placed environmental risks like climate change and loss of biodiversity as the top recognized and impactful risk globally [5], and not the risk of zoonotic diseases caused by human pathogens. Evidently, the Global Risks Report is right as the origins of zoonotic diseases like Ebola virus outbreak between the years, 2014–2016 in West Africa stem from environmental degradation particularly, deforestation, which probably forced bats—the vector of the disease, out of their usual habitat into new

ones [6]. Similarly, outbreaks of viral zoonoses like Nipah and Hendra have been linked with forest destruction which negatively affects the roosting site for fruit bat species known to be the reservoir of this viruses [3]. Increased temperature from climate change has been associated with the spread of Chikungunya virus during its outbreak in Italy [2].

The aetiological agent of the COVID-19 pandemic, SARS-CoV-2, is likely to have originated in wild horseshoe bats—which might have migrated to the wet market in Wuhan, China, probably due to loss of habitat and then transmitted to human through pangolin—a widely hunted animal known to be the intermediary host, it is, therefore, a zoonotic outbreak due to its close similarity with bat coronaviruses (SARS-CoV and MERS-CoV, respectively) in terms of structure and pathogenicity [7]. Biodiversity loss can lead to migration of these wild species into human population, close contact between humans and these wild species can lead to the emergence of new diseases. Also, hunting of these animals for food and butchering of their carcasses can lead to the rapid spread of zoonotic diseases to humans through contact with their infectious droplets [2].

As stated earlier, climate change and biodiversity loss have been reported to disrupt the pattern of human behavior and that of insect vectors. Effect on host behavior affects host immunity with more influence on increasing the zoonotic disease outbreaks [2]. In addition, permafrost soils which are hidden sources of pathogens are melting due to increased earth temperature from climate change, and this could lead to the occurrence of emerging and re-emerging diseases in the human population [8]. Increased respiratory and cardiovascular diseases, mental health threats, heat stress and geographical distribution of infectious diseases are some potential effects of climate change on human health [4].

The rising evidence of public health outcomes being intricately connected to climate change and other environmental factors as a result of anthropogenic activities calls for the prioritization of a Planetary Health approach [9]. We recommend that this approach should guide future directions of research, and also solicit for adequate funding to support this. It is also recommended that interdisciplinary collaboration amongst environmental scientists, entomologists, microbiologists, veterinarians and public health professionals is adopted, and supported.

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