

Impact of Global Warming on the Spread of Vector-Borne Diseases in the Northeastern Region

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With the threat of global warming comes the birth of multiple epidemics, one being a rise in vector-borne diseases (VBD). The impact of this threat has spread across America, particularly in the northeastern region. In a research report conducted by the nonprofit news organization Climate Central, land in the U.S that mosquitoes will inhabit is going to increase from 5 percent to 50 percent by 2100 which puts 60 percent of the northeastern population at risk for diseases like West Nile virus, dengue, and Zika¹. Important aspects to consider include the development of countermeasures to fight this growing problem and how they can decrease VBD, as well as the potential consequences to face in the future if the rise in VBDs are not brought under control.

In order to better understand how the relationship between global warming and VBDs intertwine, some information on the vector in question, mosquitoes, is needed. The aspects playing a role in vector population and transmission rates are highly various and diverse. A review article by Kilpatrick, Meola Moudy, and Kramer, all associates of the research-intensive public health laboratory of the New York State Department of Health, claim vector competence and the infected vectors that transmit the various pathogens including West Nile Virus, western equine encephalomyelitis virus, and Rift valley fever virus among others, change when populations, time, and temperature change². This is why it remains difficult to accurately depict the disease transmission rate and the impact of the diseases on human populations. As stated in a review journal published in the Annals of the New York Academy of Sciences, the mosquito species *Ae. Albopictus* has already been favored by climate change to settle in temperate climates of the United States because of temperature conditions, and it has not yet moved into every area it could potentially survive like higher latitudes in temperate regions³. From this, one can see that increased periods of warmer weather in the northeast, where climates are typically

cooler, also allows for longer periods of time that mosquitoes can roam around; explaining why there is an increase in the chance of getting bitten and attaining a VBD. With seemingly no major countermeasures in place for global warming in the United States, this epidemic will only get worse, causing many people to suffer.

Procrastination seems to be ever present in the affairs of global warming. Choices have consequences and this choice of procrastination has come with the consequence of near irreparable damage to the Earth and therefore its people. One of the only methods to effectively improve global warming which in turn will improve rates of VBD is to launch global efforts in improving the major problems that cause the spread of mosquito-borne illness as well as other related epidemics. A global effort remains imperative because only making changes at a national level will not efficiently counteract the years of damage cultivated by flippant disregard and ignorance; a global mistake requires a global solution for VBD rates to decrease. However, starting at a national level might allow for an easier transition time for each nation to begin developing skills to take to the global level and allow areas in the northeast to prepare and control the rise of VBD. Fortunately, brilliant ideas have evolved in regards to potential strategies and solutions to impede and improve this epidemic. One such idea, as stated in an article published in the Journal of Medical Entomology, calls upon the creation of a national strategy that will require the backing of multiple government and academic levels, organizations, and communities to make it effective by developing ideas for goals to attain and making federal institutes accountable; thus allowing the formation of action plans to address specific needs to accurately respond to VBD threats like education about VBD biology and its risks, detection and diagnosis, prevention and control implementations, improved resources and enough workers to carry out these plans⁴. Another idea, as presented in a conference report published in the journal

Vaccine, builds upon the idea of a global effort and states that disease X will cause a global health disaster unless public health organizations globally put in effort to begin to develop safe and effective vaccines wherever needed; therefore, a major goal of CEPI is to favor pre-developed vaccine platforms like injectable DNA or RNA that can replicate itself as well as other approaches⁵. Disease X of course refers to any potential VBD that is an immediate threat. Creating effective and safe vaccines will immensely cut down on VBDs and developing national and global action plans are critical, but they will only act as a temporary relief against these diseases and not decrease the mosquitoes that transmit them. The root of global warming needs uplifting in order to gain complete control over this epidemic.

Decreasing the root of global warming, greenhouse-gas (GHG) emissions, will cause a momentous decrease in VBDs. These GHGs have caused major increases in the Earth's temperature. As claimed by licensed doctor Andy Haines and researcher on climate change Kristie Ebi, Earth's surface temperature has risen 1°C since the preindustrial era with most of it occurring after the 1970s, as well as a rise of carbon dioxide which counts as one of the main greenhouse gases from 280 ppm in the preindustrial era to 410 ppm today⁶. Several ideas have been put forth on ways to reduce these emissions but many remain as only projects and have not become implemented on larger scales. One such idea in a journal called *Renewable and Sustainable Energy Reviews* focuses on geoengineering and new ways of increasing the rate of energy transfer back into space. The idea is about thinning out cirrus clouds over the polar ice caps because they have a warming effect on the Earth since they trap the heat that should escape out of the atmosphere more than they reflect the incoming solar radiation⁷. Doing this would therefore cool the Earth's surface and also count as a relatively safe project to try on a larger scale. Change can and should happen in urban environments as well. In a review by two

academics Orsini and Marrone, from the University of Roma Tre in Italy, they claim measures for the construction industry such as reducing energy needs while increasing energy efficiency, increasing renewable and carbon-free sources, putting an emphasis on implementing the circular economy model, using CCS and CCU technology, and using low carbon emission materials, will decrease GHGs⁸. Implementing these ideas act as gateways into allowing urban communities in the northeastern region a place to begin reducing GHG emissions. Time is slipping away though, and very soon it will be too late for any of these countermeasures to work.

If people fail to take immediate action on global warming, VBD cases will eventually skyrocket. Many unnecessary and preventable deaths will occur, and once people finally start taking this epidemic seriously, time will have run out. Halting these vectors and their acquired diseases will become infinitely harder the longer nothing happens. Entirely plausible events such as a mutation in the pathogens causing them to become harder to eradicate, mosquito populations growing beyond control and taking years to lessen their impact, or new VBDs developing and causing even more damage than known ones, drastically decreasing the human population. So many problems preventative organizations and federal governments have not even thought of will arise from this epidemic in the future and cause many regrets. For those who believe VBDs are not as serious as polar ice caps melting or sea levels rising or increased air pollution, VBDs will also have the potential to begin a cascade of negative events such as increases in the cost of healthcare because of a demand for treatment, psychological damage from loss of loved ones, panic amongst populations, and even decrease animal populations which could lessen livestock, since animals are not immune to disease.

If the United States decides to act now, 80% of experts believe other countries will follow⁹. States like New York, Maryland, Massachusetts, and Maine would benefit greatly from

immediate action plans, as their cooler climates continue to rise and mosquitoes travel further into the northeast. VBDs will harm the United States and the rest of the world greatly unless people take action. Halting this imminent problem will prevent a multitude of entirely preventable pain and deaths. Toeing this line of procrastination is entirely irresponsible and unacceptable for the future of humanity and will cause irreversible impacts people might never overcome.

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