

Infectious Disease in a Changing World

Wells Benjamin

“All I can say is that on this earth there are pestilences and there are victims— and as far as possible one must refuse to be on the side of the pestilence.” - Albert Camus, *The Plague*

Introduction

The effects of climate change are multifaceted and catastrophic, fundamentally restructuring not only the environment but also human security. Climate change [acts](#) as a “threat multiplier” exacerbating the severity of every security concern that intersects with the changing environment, often to the detriment of those directly impacted. While it lacks the panache of rising sea levels or desertification, public health may bear some of the deadliest consequences of human-driven environmental change. The past decades [have](#) been marked by deadly and fast-spreading diseases that have left millions dead, hundreds of billions of dollars lost, and significantly reshaped societies across the world. While no state, class, or region is spared from the ravages of disease, outbreaks often [widen](#) pre-existing economic divides and disproportionately impact economically disadvantaged communities. Further complicating the situation, climate change serves not only to increase the rate and ability of existing pathogens to spread but also significantly increases the chance of new diseases [transferring](#) into human populations. It is [critical](#) to global human security that states cooperate to confront these threats.

Vectors

Throughout history, diseases have profoundly shaped human civilization. From the devastation of the Black Death to the introduction of Old World pathogens to Indigenous peoples in the Americas, invisible microorganisms have [felled](#) empires and rewritten history. The transportation networks of the modern world have expanded the reach of disease beyond historical precedents. Every person alive today was affected in some way by the COVID-19 pandemic. Even remote communities, like the [Tsimané](#) people deep in the Brazilian Amazon, are no longer spared. The global economy is more interconnected than it has been at any point in human history, and this has enabled communicable diseases to thrive. Globalization as a phenomenon is not a 20th-century invention and has emerged and receded numerous times throughout human history. The direct parallel between economic interconnection and increased rates of disease outbreaks

suggests a correlation, whether it be COVID-19 or the Black Death. In either case, the pattern of zoonotic spillover enabling infection that spreads rapidly via international trade networks becomes a clear formula for a pandemic, and climate change amplifies these risks. Due to [air travel](#), COVID-19 spread from Wuhan, China, to every major city within a few months, something impossible even for the most contagious diseases of antiquity. Two key factors driving the [proliferation](#) of any disease consist of vectors and reservoirs.

Any organism that transmits disease between other organisms is a [vector](#), with malaria-bearing mosquitoes acting as a common example. Vector-borne diseases already [disproportionately](#) impact developing countries, and climate change has the potential to only exacerbate these disparities. Critical vectors like mosquitos, rats, and ticks [thrive](#) in subtropical environments, and global increases in average temperature are projected to expand their range considerably. Diseases that were once confined to the Global South like dengue fever are [projected](#) to expand considerably across Europe, North America, and Eastern Asia by 2050. The [rise](#) in natural disasters linked to climate change further exacerbates the risk of disease. Floods and hurricanes strain sanitation infrastructure and directly [spread](#) disease by contaminating water supplies. Increasingly severe [droughts](#) brought on by higher [temperatures](#) have a devastating effect on food security, and malnutrition increases an individual's susceptibility to infection. Yemen's [ongoing](#) cholera epidemic may serve as a grim glimpse into the future, with political instability and unfavorable weather driving the largest outbreak of Cholera in recent history. As old diseases thrive in our changing climate, new pathogens threaten to emerge.

Reservoirs

The discovery of ancient microbes in melting [permafrost](#) has captured public attention, with scientists in Siberia identifying so-called 'zombie viruses' capable of infecting mammals. These unknown diseases represent a real [threat](#), but one of unclear severity due to the unpredictable nature of their pathogenicity. A far more pressing issue is that of diseases already present in the environment adapting to infect humans. [Zoonotic spillover](#) occurs when a disease present in one animal species adapts to become capable of spreading to a different species and is the primary source of emerging infectious diseases. This [phenomenon](#) likely caused the COVID-19 pandemic, as well as many other major diseases like HIV/AIDS, Ebola, and rabies. As

[deforestation](#) continues, particularly in developing economies where households often depend on wood for fuel, the risk of zoonotic spillover increases. Spillover has numerous pathways, but one of the most pressing is [wet markets](#), where individuals sell wild game openly. Many [researchers](#) point to wet markets as the source of Bird Flu and COVID-19, as infected bushmeat introduces latent pathogens into the human population. As a result, climate change can accelerate the emergence of new diseases globally.

Insecurity and Infection

Disease is just as much a political phenomenon as it is a biological one, and climate change can exacerbate instability, paving the way for deadly pathogens to spread. A dangerous feedback loop exists between disease, climate change, and stability - when one worsens, it amplifies the risks of the others. [Climate refugees](#) face displacement, increasing the risk of disease transmission and societal instability. The squalid conditions of refugee [camps](#) that lack sanitation, running water, and medical care create ideal conditions for the spread of disease. Anywhere that order begins to devolve, disease can spread rapidly, a prime example being [Gaza](#), where Polio began infecting children last year. Additionally, COVID-19 triggered a severe economic shock, [disproportionately](#) affecting developing nations. Climate change threatens all economies, but those reliant on [agriculture](#) will face the worst effects. As economic downturns driven by climate change erode state institutions, promoting insurgency and violence, combating disease will become even more difficult. The [Ebola](#) outbreak in 2014 required a massive international effort and two years to be contained, [claiming](#) over 10,000 lives in Africa. A critical question remains: is the international community willing and capable of mounting a similar response to a future pandemic? During the peak of COVID-19 developed states [hoarded](#) vaccines and PPE, severely disadvantaging developing countries. The recent [weakening](#) of global health institutions, such as the World Health Organization, undermines future coordinated international responses.

Adaptation

The U.S. has a vital interest in combating the spread of disease, not only to protect its citizens but also to curb global instability. Containing disease is uniquely challenging, as it transcends borders, and often spreads unnoticed. While epidemics are usually contained and managed with a

cooperative international response, pandemics like COVID-19 drive even the wealthiest states towards a [zero-sum](#) approach, which is when states move away from cooperation on health issues, instead preferring to explicitly and solely focus on the health of their citizens. Disease, much like climate change, is not an issue that can be addressed singularly. Without coordinated global preparation, the economic, social, and political [mistakes](#) of the COVID-19 era will be repeated. Historical responses to pandemics that shy away from cooperation are often [ineffective](#), and an example can be found in the proliferation of the 1918–1920 flu pandemic, where politically motivated suppression of health information was instrumental in its spread.

The current administration has made it [clear](#) it is moving away from the traditional neoliberal institutionalist approach to foreign affairs that has dominated U.S. policy since 1992. With the [decline](#) of American foreign aid, it remains unclear whether any other force can fill the gap, and the world may be shifting towards a more nationalist approach to disease prevention. If this is the case, the U.S. should focus on rigorous disease screening at ports of entry, maintaining medical research, ensuring stockpiles of critical medical supplies, and controlling vector populations within American borders. Extensive cooperation between the government and American biomedical/pharmaceutical companies could also be practiced, given that [much](#) of the global market share is controlled by American firms. Regional organizations may attempt to fill roles once held by international ones, but it is unclear if an African or South American public health bloc would have the capital (both political and financial) required to be effective. The global nature of infectious disease does not lend itself easily to nationalist approaches, and a lack of international cooperation would increase disparities between the developed and developing world.

The bright-eyed [multinational](#) and voluntary approach to reversing climate change has yielded mixed results and has largely fallen short of its stated goals. The 2016 [Paris Agreement](#) projected that limiting global warming to 1.5°C required emissions to peak prior to 2025 and decline by 43% by 2030. As 2025 arrives, this goal remains [unmet](#). If environmental degradation worsens, so will political stability, and with it public health. Hope remains for new global health initiatives and [technological](#) breakthroughs to counter infectious diseases, yet such efforts are currently insufficient. The world is changing faster than ever before. Without urgent action - on the

national or international level - to mitigate the risks of infectious disease: the world may soon behold a pale horse - not as a distant fear or primal memory, but as a brutal force reshaping the future in its image.