# The Role of Climate in Burning the Lines between Human and Animal Diseases

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## Abstract

Highly complex intersections are created between animal and human health due to shifts in disease dynamics caused by climate change. Ecosystems are being transformed by enhancing global temperatures, intensified weather events, and altered precipitation patterns. It is leading to closer contact between humans and wildlife and facilitating the emergence of zoonotic diseases. Pathogens are extending their range, evolving to adapt to new climates and impacting areas previously unexposed to specific diseases. As mosquitoes and ticks are expanding their regions by taking advantage of prolonged breeding seasons in warm regions, the vector-borne diseases malaria, dengue, and Lyme diseases are proliferating. Moreover, human actions like urbanization, deforestation, and intensive agriculture disturb natural ecosystems thus decreasing biodiversity and weakening ecological barriers which help prevent disease spread. Famous outbreaks of diseases such as Zika, Ebola, and Nipah highlight the relationship between environmental degradation, change in climate, and disease spillover, where animal and human populations increasingly share spaces, increasing risks of infection. Rising global populations and urbanization are accelerating the spread of pathogens through dense living conditions and rapid human travel, making it easier for diseases to cross geographical borders. To mitigate the impact of climate-driven diseases a proactive One Health approach that unites animal, human, and environmental health is critical. It needs strategic ecosystem management, robust public health policies, and strengthened disease surveillance. To protect global health in an era of environmental and ecological instability, coordinated efforts in research, policy, and community resilience are essential.

**Keywords:** Climate Change, Zoonoses, Vector-Borne Diseases, Biodiversity Loss, Disease Spillover Dynamics, Ecosystem Health, One Health Approach

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## Introduction

In the past few decades, the complex relationship between the transmission of infectious diseases and climate change has become more obvious. Climate variability can disturb wildlife habitat, change ecosystems, and alter the dynamics of vectors and pathogens creating new ways of disease transmission. For making good policies to alleviate the influence of climate on health understanding this relation is necessary. A great number of rising infectious diseases occur because variability in climate favors increased contact among domestic animals, wildlife, and humans. The boundaries that differentiate between animal and human diseases become more blurred due to changes in precipitation, increases in temperature, and extreme weather events. Intergovernmental Panel on Climate Change [IPCC], 2023). The return of diseases such as dengue and malaria and known recent outbreaks like COVID-19 underscore how climate change can influence the dynamics of disease (Daszak, 2022).

One health approach highlights the interconnectedness of animal, human, and environmental health. It is one of the major frameworks for understanding the relationship between climate and health. This holistic approach is significantly relevant in the context of climate variability because it emphasizes that human health cannot be separated from ecosystems in which humans live (Centers for Disease Control and Prevention [CDC], 2022). Collaboration between veterinary medicine, public health, and environmental science is encouraged by one health approach to address complicated challenges caused by climate change. One of the aims of this chapter is to analyze the character of climate in molding the relationship between animal and human diseases mainly focusing on zoonotic infections. It will dig into aspects by which climate affects the spread of disease, encircling the influence of increases in temperature, frequent extreme weather events, and varying precipitation patterns. Further, this chapter will also discuss the impact of climate change on the behavior of wildlife and their migration patterns that boost the probability of zoonotic spillover events (Daszak, 2022). The objective of this chapter is to analyze the complex connections between climate change and the transmission of infectious diseases, especially zoonotic infections. It aims to explore how climate change like varying temperature, precipitation, and weather events impacts disease dynamics and fosters interactions between animals, humans, and ecosystems. Moreover, it provides case studies to show real-world examples of climate-driven zoonotic outbreaks and also offers insights into strategies for effective management and disease prevention.

## 2. Disease Dynamics and Climate Variability

The main focus of public health officials and researchers is the interconnectedness between the transmission of infectious diseases and change in climate as shown in Figure 1 Climate change directly impacts the dynamics of infectious disease, significantly zoonotic diseases which can transfer between humans and animals. Understanding the influence of climate on the transmission patterns and life cycle of pathogens and vectors is necessary to develop disease control strategies (Rocklöv & Dubrow, 2022).

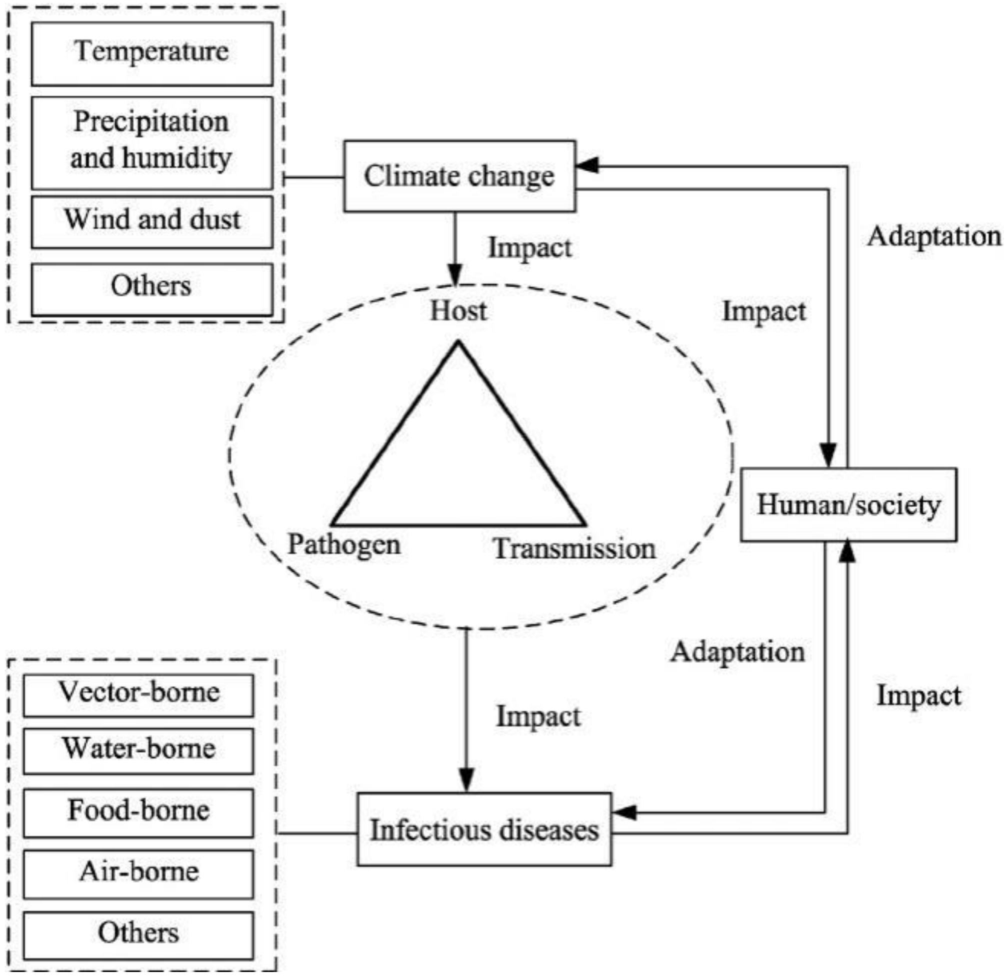


**Fig. 1:** Climate change and disease dynamics (Wu et al., 2015).

## 3. Rise in Temperature and Vector-Borne Diseases

The Spread and intensity of vector-borne diseases are highly influenced by the increase in temperature which is the main aspect of climate change. The diseases that are spread by vectors such as flies, ticks, and mosquitoes are extremely sensitive to changing temperatures. Vectors can spread into new areas, changing the geographical distribution and enhancing the risk of outbreaks in regions that were not affected earlier due to temperature rise (Watts et al., 2021).

### 3.1 Increasing Temperature and Vector Behavior

Behavior, physiology, and reproduction of disease-carrying vectors are affected by temperature. Hot temperatures can fasten the life cycles of vectors which will lead to an increase in the rate of reproduction decrease in development periods. For instance, warmer temperatures can decrease the time of larval stage of mosquitoes which will increase the number of adults which can spread diseases such as dengue and malaria. Global warming can cause frequent and serious outbreaks of vector-borne in areas with increasing temperatures (Caminade et al., 2022).

Dengue is spread by Aedes aegypti. Due to the rise in global temperatures Aedes aegypti has become able to thrive in areas that were earlier too cool for its survival, like North America and Southern Europe. Cases of dengue arose in these areas that historically had little to zero transmission. It has posed a new threat to public health systems (Messina et al., 2022).

### 3.2 Vector-Borne Diseases and their Geographic Expansion

Rising temperatures have caused the geographic expansion of vector-borne diseases in temperate regions where people have less immunity to these diseases. For example, the range of malaria was restricted to warmer regions and is now expanding to high-altitude areas in East Africa and South America where it was previously very cool for Anopheles mosquito to survive (Ryan et al., 2020). Likewise, in regions of southern Europe and the southeastern United States rise in temperature has been associated with the transmission of chikungunya and Zika diseases (Mordecai et al., 2021).

### 3.3 Case Study: Change in Climate and Return of Lyme Disease

*Borrelia burgdorferi* is a cause of Lyme disease which is transmitted by Ixodes ticks. In recent years due to climate change, the range of Lyme disease has extended notably. Due to the longer growing season and rise in temperature ticks have become able to survive in Europe and North America thus causing a return of Lyme disease (Beard et al., 2021).

### 3.4 Case Study: Resurgence of Malaria in High-Altitude Areas

Plasmodium parasite is a cause of malaria and it is transmitted by Anopheles mosquitoes. In the past, the disease was restricted to subtropical and lowland tropical regions where temperatures were favorable for the growth and survival of mosquitoes. Recent studies indicated a change in the spread of malaria to high-altitude regions because of an increase in temperature. Anopheles mosquito has become able to reproduce and thrive in the highlands of East Africa due to the temperature rise. Earlier those regions were not suitable for the survival of Anopheles. This change has become a cause of malaria in regions like the Ethiopian Highlands, where people had weak immunity because of the absence of disease in the past Arega et al. (2023).

A study by (MacDonald et al., 2022) shows that temperature rises not only extend the range of mosquitoes but also shorten the development period of Plasmodium within Anopheles thus leading to higher transmission rates. This shows the complicated relation among disease dynamics, vector behavior, and temperature, highlighting how even a minor temperature change can significantly influence the health of humans. Examples of some vector-borne diseases affected by increasing temperature are given in Table 1.

**Table 1:** Examples of Zoonotic Diseases Affected by Climate Change (Daszak, 2022; CDC, 2022)

| Disease | Vector |
|---|---|
| Malaria | *Anopheles* mosquitoes |
| Lyme Disease | *Ixodes* ticks |
| Dengue | *Aedes aegypti*, *Aedes albopictus* |
| Chikungunya | *Aedes aegypti*, *Aedes albopictus* |

### 3.5 Incubation Period of Pathogen and Temperature

A temperature rise has a major impact on the extrinsic incubation period (EIP) of pathogens within vectors. The time required by a pathogen to develop into an infectious stage inside a vector before its transmission to a new host is known as the EIP. The EIP is generally shortened by high temperatures thus allowing vectors to become infectious more quickly. It increases the possibility of disease transmission (Mordecai et al., 2021).

As temperature increases above 25 °C the extrinsic incubation period of dengue virus decreases within Aedes mosquito. In cooler temperatures, mosquitoes can transmit the virus over 14 days but at higher temperatures, it can transmit as quickly as 7 days. This rapid transmission cycle means that the risk of dengue outbreaks is higher in regions facing heat waves and sustained temperatures (Messina et al., 2022).

### 3.6 Implications for Disease Control and Public Health

The varying dynamics of vector-borne disease because of increasing temperatures present a major threat to public health systems. As vectors adapt to new conditions the traditional control measures like vector habitat management and use of insecticides may become less effective. Moreover, health systems in cooler regions that have recently been affected by dengue and chikungunya may lack the experience and infrastructure to properly manage these outbreaks (Rocklöv & Dubrow, 2022).

Innovative approaches are required to control vectors to reduce the risks caused by an increase in temperature like the use of genetically altered mosquitoes and the making of early warning systems that can foretell outbreaks based on temperature trends. Incorporation of public health planning and climate data can assist in recognizing emerging hotspots for vector-borne diseases. It allows for targeted interventions that can decrease the burden of diseases (Beard et al., 2021).

## 4. Emerging Diseases and Extreme Weather Events

Due to climate change extreme weather events such as droughts, heatwaves, hurricanes, and floods are becoming more frequent. The ecosystem is hugely disturbed by such events. They also displace animal and human populations and create conditions that are favorable to the transmission of emerging diseases. Extreme weather events can act as catalysts influencing food and water supplies, changing vector and pathogen behavior, and weakening community resilience thus leading to outbreaks (Watts et al., 2021).

**Table 2:** Extreme Weather Events and Disease Outbreaks (Ryan et al., 2020; IPCC, 2023).

| Weather Events | Associated Diseases |
|---|---|
| Hurricanes | Dengue, Zika, West Nile Virus |
| Floods | Cholera, Leptospirosis, Malaria |
| Droughts | Leishmaniasis, Waterborne Infections |
| Heatwaves | West Nile Virus |

### 4.1 Floods and Hurricanes: Driver of Vector-Borne and Water-Borne Diseases

Heavy rainfall and hurricanes can lead to flooding, contamination of water sources, and developing breeding grounds for vectors such as mosquitoes. Flooding can destroy sewage systems which results in waterborne diseases like typhoid, leptospirosis, and cholera. In regions like South Asia outbursts of leptospirosis have been reported after severe flooding because here contaminated water helps in the transmission of pathogens. Moreover, floods can develop dirty and static water pools which serve as ideal breeding places for vectors like mosquitoes. This can cause diseases such as dengue and malaria after flood events. A rise in dengue cases reported in Southeast Asia after heavy monsoon rains shows a direct relationship between increased vector activity and flooding (Dhewantara et al., 2021). A few examples of diseases linked with extreme weather events are shown in Table 2.

### 4.2 Droughts and the Transmission of Waterborne Pathogens

Floods cause waterborne disease because of contamination and drought also plays a vital role in spreading disease by decreasing the availability of clean water. If a drought lasts for a longer time it forces humans and animals to depend on unsafe water resources that may harbor pathogens like Giardia and Cryptosporidium (Rocklöv & Dubrow, 2022). Cases of diarrheal diseases have increased in Sub-Saharan Africa where climate change has intensified the drought conditions (González et al., 2021).

Droughts can also change animal behavior, forcing wildlife to come near the human populations in search of water thus leading to zoonotic spillover events. Reduced water availability drives rodents carrying hantavirus to come closer to human settlements, increasing the risk of transmission. To deal with the health impacts of drought emergency water provision and long-term planning are needed to better water infrastructure and ensure resilience against upcoming climate change (Daszak, 2022).

### 4.3 Heatwaves and Dynamics of Vector-Borne Disease

Heatwaves are becoming more frequent and intense. Several vector-borne diseases are directly affected by heat waves. The potential for transmission of disease is enhanced in higher temperatures during heatwaves. Culex mosquitoes become more active and virus replication is accelerated in warmer conditions during heatwaves and it has increased the spread of West Nile Virus in regions of North America (Caminade et al., 2022).

Moreover, heatwaves can exert stress on animals resulting in poor immune systems making them more prone to diseases that could spill over into human communities. An outbreak of Rift Valley Fever is caused in livestock by heat stress and it can also be transmitted to humans via contact with infected animals (Arega et al., 2023).

### 4.4 Case Study: Cholera Outbreaks after Extreme Weather Events

Vibrio cholera which is causing agent Cholera is extremely sensitive to climatic conditions, significantly those impacted by extreme weather events. Brackish water is favorable for the growth of bacteria and their numbers can enhance after hurricanes and storms which present nutrients in coastal waters. In Yemen, high rainfall and flooding in 2017 aided in a severe cholera outbreak thus affecting millions of people (Paz & Semenza, 2022).

A study by Daszak (2022) showed that intense rainfall enhanced the risk of cholera because floods washed away the bacteria into reservoirs and rivers used for drinking water. The study highlighted the need for improvement of water infrastructure and management to avoid outbreaks in areas more prone to climate-driven extreme weather events.

## 5. Wildlife Migration and Zoonotic Spillovers

Climate change has a major influence on patterns of migration. It alters animal movements and creates new opportunities for zoonotic diseases to spill over into human populations. Animals are forced to migrate due to altering temperatures, vegetation, and precipitation. It brings them into closer contact with domestic animals and human populations (Gibb et al., 2022).

### 5.1 Climate-Induced Changes in Migration Patterns

The availability of food and water resources that are important for the survival of wildlife animals is directly impacted by climate change. Alterations in rainfall patterns and rising temperatures can change the distribution of prey animals and plants thus forcing herbivores and predators to move towards new regions. The chances of pathogen transmission are increased when species migrate to more suitable environments because they may encounter agricultural areas and human populations that were earlier outside their range (Parmesan et al., 2020). A few diseases that are caused due to wildlife migration are shown in Table 3.

The interaction between climate-forced changes in bat migration patterns and enhanced contact with humans in Southeast Asia is highlighted in a study by Carlson et al. (2022). The risk of spillovers of viruses like Corona and Nipah viruses is elevated because deforestation has led to habitat loss and altering seasons, forcing bat populations closer to human settlements (Carlson et al., 2022).

**Table 3:** Zoonotic diseases due to wildlife migration (Smith et al., 2020).

| Disease | Primary Animal Host |
|---|---|
| Ebola | Fruit bats |
| Rabies | Foxes, bats |
| Hantavirus | Rodents |
| Lyme Disease | Deer, rodents |

### 5.2 Case Study: Bats and Emerging Viruses

Bats are the hosts for many zoonotic disease-causing viruses including lyssaviruses which are causes of rabies, coronaviruses, and filoviruses such as Ebola. The probability of spillover events is enhanced because climate variability has greatly changed bat populations' shelter and foraging behavior (Carlson et al., 2022). In Africa and Southeast Asia, the migration patterns of fruit bats are impacted due to shifts in the fruiting season of a few plants caused by altering rainfall patterns (Daszak, 2022).

In West Africa outbreak of Ebola occurred in 2014-2016. Research shows that a sequence of altering weather patterns and habitat loss brought fruit bats closer to humans which facilitated the spillover of the Ebola virus. To predict the future outbreaks understanding of such correlations is important because it highlights the demands for habitat protection as part of public health plans (Gibb et al., 2022).

### 5.3 Effect on Livestock and Domestic Animals

Transmission of diseases that affect both animals and humans is facilitated by the migration of wildlife into areas where humans raise livestock. The movement of wild ungulates because of drought forces them to come into closer contact with domestic cattle and it becomes the cause of transmission of diseases such as brucellosis and anthrax (Ryan et al., 2020). Likewise, during seasonal migration migratory waterfowl come into contact with domestic poultry increasing the risk of transmission of avian influenza (Parmesan et al., 2020).

Research by Rocklöv and Dubrow (2022) highlighted the role of climate-activated wildlife migrations in the transmission of zoonotic diseases to livestock. It concluded that aggregation of domestic and wild animals increased the risk of disease outbreaks in regions impacted by flooding and droughts.

## 6. Alterations in Ecosystems and Disease Ecology

Climate variability is shifting the ecosystems all over the world. It is leading to changes in predator-prey relationships, alteration in vegetation, and shifts in biodiversity. All these ecological changes can directly impact the transmission dynamics of infectious diseases. It affects the distribution and abundance of hosts, pathogens, and vectors (Rohr et al., 2021).

### 6.1 Altered Vegetation and Vector Habitats

Alterations in vegetation zones have occurred due to shifts in temperature and precipitation patterns. This change in vegetation affects the habitats of vector species such as ticks, sandflies, and mosquitoes. Mosquito species such as Aedes aegypti have expanded their range into previously cool regions due to the rise in temperatures (Ryan et al., 2020). Due to this extension cases of diseases such as dengue, Zika, and chikungunya have increased in areas of the United States and Southern Europe (Caminade et al., 2022).

Changes in vegetation and climate can create suitable habitats for disease vectors. This phenomenon is evident from the spread of the Aedes mosquito in new regions. Growth of dense vegetation is enhanced by increased humidity and high rainfall thus providing more breeding sites for mosquitoes. Urban outbreaks of diseases such as Zika and Dengue can occur because drought can force mosquitoes to breed in artificial water containers in urban areas (Rocklöv & Dubrow, 2022). How different ecosystem changes affect disease-causing vectors is elaborated in Table 4.

**Table 4:** Impact of Ecosystem Changes on Vector-Borne Diseases (Jones et al., 2019).

| Ecosystem Change | Affected Vectors |
|---|---|
| Deforestation | *Anopheles* mosquitoes |
| Urbanization | Aedes aegypti |
| Shrubland Expansion | *Ixodes scapularis* (tick) |
| Wetland Degradation | *Culex* mosquitoes |

### 6.2 Biodiversity and the Dilution Effect

The dilution effect hypothesis assumes that high biodiversity can decrease the spread of some infectious diseases by diluting the pool of competent hosts. It can reduce the overall risk of human infection. Vectors such as ticks are less likely to find a host that is capable of spreading pathogens in ecosystems with a wide range of species. Habitat loss and climate change can reduce biodiversity can enhance the prevalence of diseases such as Lyme disease by concentrating vectors on a few highly competent host species like deer and mice (Rohr et al., 2021).

Evidence for the dilution effect related to West Nile Virus is provided by a study conducted by Gibb et al. (2022). The research revealed that the incidence of the virus in both humans and birds decreases in areas with greater bird species diversity. This occurs because mosquitoes encounter a wider range of non-competent hosts, reducing the likelihood of virus transmission.

### 6.3 Ecosystem Degradation and Disease Emergence

Desertification, wetland drainage, and deforestation can lead to degradation of ecosystems. It can directly contribute to the rise of infectious diseases (Figure 2). For instance, deforestation in warmer areas has been connected to the enhanced spread of malaria, mosquito population grows stronger in newly exposed sunlit water pools (Ryan et al., 2020). Likewise, the habitat of amphibians and waterfowls is altered by the draining of wetlands thus disturbing the natural control of mosquitoes and aiding the outbreaks of diseases like Rift Valley Fever (Rohr et al., 2021).

The spread of avian influenza is also impacted by alterations in bird movements due to wetland degradation. When wetlands reduce, migratory birds gather in smaller areas thus increasing the chances of pathogen transmission. These concentrated bird populations can serve as reservoirs for influenza viruses that may spill over into domestic poultry and humans (Caminade et al., 2022).

## 7. Adaptation and Mitigation Strategies for Climate-Driven Disease Risks

The increasing influence of climate change on animal and human health has led to an adaptation of different mitigation strategies to reduce disease risk. The purpose of these strategies is to cope with environmental changes, boost public health systems, and nurture resilience in communities that are at high risk of climate-driven health impacts (Rocklöv & Dubrow, 2022).

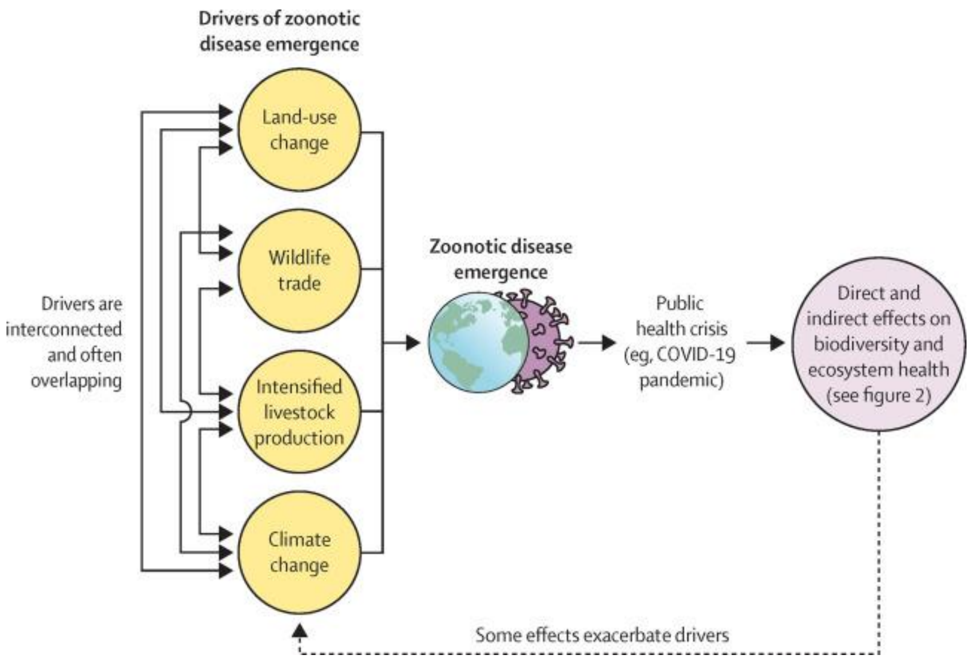


**Fig. 2:** The pathways through which ecosystem changes drive disease emergence and zoonotic transmission (Lawler et al., 2021).

### 7.1 Strengthening Disease Surveillance Systems

Strengthening disease surveillance systems is one of the most important components of adapting to climate-driven disease risks. To detect the early emergence of infectious diseases a strong surveillance system is required. It enables rapid responses to contain outbreaks and prevent their spread. Tracking wildlife movements, monitoring vector populations, and integrating climate data to predict disease hotspots should be included in the disease surveillance system (Caminade et al., 2022).

Integration of traditional epidemiological data with satellite-based climate monitoring has proven results in forecasting outbreaks of vector-borne diseases like dengue and malaria. To predict malaria outbreaks in East Africa, remote sensing technologies have been used. They track vegetation changes and rainfall that signal enhanced mosquito breeding. Due to these innovations larvicide spraying is used in high-risk areas to improve the efficiency of public health responses (González et al., 2021).

### 7.2 Climate-Resilient Infrastructure and Vector Control

Another crucial strategy for alleviating disease risks is to build such infrastructure that is resilient to climate change. This includes improving sanitation, water, and hygiene facilities that are important to prevent diseases such as cholera, especially during high rainfall and floods. To reduce human exposure to vectors, climate-resilient houses should be made because they provide better insulation and screening against insects (Ryan et al., 2020).

Vector control is one of the essential steps to control diseases such as dengue, malaria, and chikungunya. Innovative methods such as Wolbachia bacteria and genetically modified mosquitoes are being complemented with traditional approaches like indoor residual spraying and the use of insecticide-treated bed nets to control populations of mosquitoes (Parmesan et al., 2020).

### 7.3 Community Engagement and Education

Community engagement is important to build local resilience for climate-driven disease risks. Educating communities about the connection between health and climate variability can enable people to take precautionary measures like adopting safe food and water storage practices and eliminating standing water to reduce mosquito breeding during extreme weather events (Rocklöv & Dubrow, 2022).

A study by Daszak (2022) showed that community cooperation in managing zoonotic diseases in rural areas is very crucial because human and wildlife interactions are most frequent there. Engaging local communities to report unusual deaths and monitoring wildlife health can serve as an early warning system for disease outbreaks. It allows authorities to take preventive actions before spillover occurs. This method has been significantly effective in areas where traditional surveillance systems may be limited by resources and geography.

### 7.4 International Collaboration and Policy Frameworks

International collaboration is needed to address the global nature of climate change and its effect on disease spread. The aim of global health initiatives like the World Health Organization's (WHO) Climate and Health Program is to support countries in developing climate adaptation strategies which include targeted interventions and health risk assessments. For sharing epidemiological data, research, and implementing cross-border plans to control populations of vectors, collaborative efforts are required (WHO, 2022).

A policy framework for countries to work together in mitigating climate change and its impacts on health is provided in the Paris Agreement that was adopted in 2015. Its primary focus is on decreasing the emissions of greenhouse gas but it also points out the importance of adapting health systems to withstand climate change. Implementation of these frameworks at a higher level can assist countries in preparing for health risks posed by climate variability and developing resilient health infrastructure (WHO, 2022). Many international health initiatives are addressing climate-driven diseases as illustrated in Table 5.

**Table 5:** International Health Initiatives Addressing Climate-Driven Diseases (WHO, 2022)

| Initiative | Objective |
|---|---|
| Global Vector Control Response (GVCR) | Reduce the burden of vector-borne diseases globally |
| WHO Climate and Health Program | Strengthen global response to climate-related health risks. |
| One Health Approach | Integrate human, animal, and environmental health efforts. |
| Paris Agreement | Global framework to limit global warming and build climate resilience |

### 7.5 Case Study: Adaptation Strategies in Bangladesh

Due to its vulnerability to cyclones, flooding, and changing rainfall patterns, Bangladesh is mostly cited as a case study for climate adaptations in public health. Flood-resistant housing, construction of cyclone shelters improved wash infrastructure, and a range of different strategies are implemented by the country. These adaptations have been very important in decreasing the chances of waterborne disease during extreme weather events (Rocklöv & Dubrow, 2022).

Additionally, to educate the public, monitor disease outbreaks, and distribute medical supplies a network of community has been established in Bangladesh. Such efforts show that targeted adaptation plans can effectively decrease climate-imposed disease threats (Daszak, 2022). Some of the major zoonotic infections controlled by various countries by implementing different strategies are discussed in Table 6.

**Table 6:** Adaptation strategies for control of zoonotic diseases.

| Country | Key Strategies Implemented | Zoonotic Disease Focus | Reference |
|---|---|---|---|
| Bangladesh | Community-based early warning systems, improved livestock management, and strengthened public health infrastructure. | Nipah Virus | Arega et al. (2023) |
| United States | Integrated vector management, habitat modification, and public awareness campaigns to reduce mosquito-borne diseases. | West Nile Virus | Caminade et al. (2019) |
| Brazil | Deforestation control, biodiversity preservation, and targeted vaccine campaigns. | Yellow Fever | Rocklöv & Dubrow, 2022. |
| India | Urban sanitation improvements, water resource management, and real-time disease surveillance systems. | Dengue | Srivastava (2018) |
| Australia | Wildlife monitoring, disease outbreak modeling, and conservation initiatives. | Hendra Virus | Daszak et al. (2020) |
| Democratic Republic of Congo | Zoonotic spillover prevention through community outreach, bushmeat regulation, and biodiversity conservation. | Ebola Virus | Beard et al, (2021) |

### 7.6 The Role of Technology in Adaptation Efforts

Technology can play a major role in adapting to the health impacts of climate change. The speed and accuracy of public health responses can be enhanced by digital tools such as mobile health applications that can aid the real-time reporting of disease cases and vector responses. To map disease risk regions which allow authorities to focus resources on high-risk zones, help can be taken from Geographic Information System (GIS) (Caminade et al., 2022).

Using GIS in the US to track the spread of Lyme disease has facilitated researchers to find a relation between tick movements with changes in climate and vegetation. This data has helped in assessing seasonal outbreaks and applying control measures. The world is warming day by day and integration of technologies in public health systems is crucial to build resilience against health impacts (Rohr et al., 2021).

### Conclusion

The correlation between the spread of infectious diseases and change in climate is a major threat in the 21st century. This chapter has highlighted that by changing environmental conditions and disturbing ecological balances, climate change has enhanced the risk of both vector-borne diseases and zoonotic diseases. Because of the continuous shifts in global climate, it has now become evident that traditional methods of disease management must evolve to consider the dynamic impacts of climate on animal and human health.

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