FIND
Diagnosis for all

Policy brief

Diagnostics &
climate change

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How might climate change affect diagnostic needs?

Changing temperatures, environmental circumstances and extreme weather events caused by climate change can affect the geographic spread and intensity of disease. For example, flooding may lead to spread of water-borne diseases, through damage to sanitation facilities resulting in contamination of water supplies. Stagnant water after flooding can become a breeding ground for mosquitoes. In Pakistan in 2022, unprecedented flooding led to a surge in cases of the vector-borne disease dengue fever, with over 25,000 cases reported in the first 9 months of the year, the majority of which occurred after the floods.[1]

Extreme weather and long-term degradation of ecosystems such as desertification and rises in sea levels can lead to population displacement. Displaced populations are especially vulnerable to disease outbreaks during migration or when living in temporary settlements such as evacuation centres or refugee camps. Limited disease surveillance, poor access to healthcare, crowded living conditions and lack of sanitation infrastructure in these settings contributes to spread of infectious disease, and delayed diagnosis and depleted medicine supplies can exacerbate the burden of chronic non-communicable diseases.[2]

Climate change may also increase the risk of appearance, exposure to and spread of newly emerging pathogens, such as COVID-19. Migration caused by habitat destruction can bring previously isolated wild animal populations into contact with other mammals, including humans, increasing the risk of cross-species transmission. An increase in 'biodiversity hotspots' – regions that contain a high number of different species – is predicted to lead to an increased risk of transmission of pathogens from animals to humans, known as 'zoonotic spillover'. This makes climate change one of the greatest future risk factors for disease emergence.[3]

Diagnostics are central to early detection and management of both infectious disease outbreaks and non-communicable diseases. Ensuring that populations affected by climate change can access diagnostics is essential to support public health and prevent disease spread. Additionally, strengthening disease surveillance to better understand disease transmission among animals, both domesticated and wildlife, as well as to detect outbreaks in humans, will be crucial to protecting global health security as the climate continues to warm. For all these reasons, climate change is expected to increase demand for diagnostic tools.

What are the unmet diagnostic needs?

Many diseases that could increase in prevalence as a result of climate change do not currently have available diagnostics.[4] There is currently no diagnostic test for 60% of the World Health Organization "Blueprint" pathogens, which have been identified as having the greatest outbreak potential.[4] As many of these outbreak-prone diseases have animal, vector or environmental sources, there is an urgent need for development of diagnostics that can support surveillance of these diseases across sectors, facilitating a One Health approach, as well as to support vaccine development programmes. Genomic sequencing is an essential surveillance tool, allowing the genetic material of pathogens to be monitored so that any changes can be detected, and sequencing infrastructure that was built during the COVID-19 pandemic can now be leveraged for other diseases. Wastewater and other environmental sample surveillance can also provide early warning signals of emerging pathogens or drug resistance, well before cases reach clinics. Multiplex diagnostic tests, which can identify multiple pathogens within a single test, can also speed up the identification of unusual pathogens. Digital tools that can aggregate data from different sources, and tools that can transmit results from diagnostic tests to surveillance systems, can further support One Health surveillance and provide more comprehensive and accurate information on disease prevalence in the era of climate change.[5,6]

Changes in global temperatures may lead to emergence or re-emergence of pathogens in areas where they would not normally be endemic; for example, malaria in northern Europe. This may require additional, decentralized manufacturing capacity for existing diagnostics to ensure that global and regional needs can be met. In addition, built-in surge capacity is needed to facilitate rapid scale up of manufacturing of diagnostics for emergency responses in outbreak situations, which are expected to increase in frequency as the climate changes. Increasing global temperatures may impact currently existing essential diagnostics, some of which are only stable at lower temperatures. These diagnostics will need to be adapted for stability at higher temperatures, particularly for regions that are experiencing the highest rates of temperature increase.

SUMMARY

Climate change will precipitate and exacerbate disease outbreaks and health emergencies. Diagnostics are vital to protecting the health of populations affected by climate change events and to detecting emerging and re-emerging diseases occurring as a result of environmental changes. Investment in disease surveillance and development of diagnostics for outbreak-prone diseases suitable for use at high temperatures will be increasingly necessary to protect public health as the impacts of climate change are observed.

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ABOUT THIS POLICY BRIEF

FIND accelerates equitable access to reliable diagnosis around the world. We are working to close critical testing gaps that leave people at risk from preventable and treatable illnesses, enable effective disease surveillance, and build sustainable, resilient health systems. In partnership with countries, WHO, and other global health agencies, we are driving progress towards global health security and universal health coverage. We are a WHO Collaborating Centre for Laboratory Strengthening and Diagnostic Technology Evaluation.

From time to time, FIND publishes technical briefs and policy briefs on issues relevant to the diagnostics equity agenda. All briefs, including this one, are prepared by FIND staff and reflect FIND's view at the time of publication. Further information on this and other technical briefs and policy briefs can be found on our website at **www.finddx.org**. We also welcome feedback on this and other briefs at **info@finddx.org**.

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