# Climate change drives dangerous fungal infections to spread across Europe and beyond



The climate crisis is accelerating the global spread of dangerous fungal infections, with rising temperatures allowing pathogens like Aspergillus fumigatus and Aspergillus flavus to infiltrate new regions. This development poses a growing health risk, particularly for vulnerable populations, as exemplified by recent research conducted by scientists at the University of Manchester.

Aspergillus fumigatus is known for causing aspergillosis, a severe and sometimes fatal lung infection, while Aspergillus flavus primarily threatens crops and synthesizes carcinogenic aflatoxins. Current modelling suggests that A. fumigatus could expand its range by 77 per cent by 2100 under high-emission scenarios, potentially exposing an additional nine million people across Europe to this harmful fungus. At the same time, A. flavus is projected to spread over 16 per cent more land globally, putting food security and human health at risk, especially in regions already grappling with climate-induced stress.

Dr. Norman van Rhijn, one of the study's authors, highlighted that environmental parameters—such as humidity and extreme weather—will significantly shape these fungi's adaptation and distribution. This is concerning given the global health burden that fungal infections represent, particularly since they have long been neglected in public health discussions compared to their bacterial counterparts. With fewer than 10 per cent of the world's fungal species described, the potential for emerging threats remains high.

The World Health Organisation recently identified fungal pathogens as critical threats for the first time, signalling a shift in focus towards these often-overlooked infections. Despite this recognition, funding for fungal research remains disproportionately low, an issue that the Wellcome Trust is trying to address with a commitment of over £50 million towards fungal disease research. Dr. van Rhijn noted, “We have already observed the emergence of Candida auris due to rising temperatures, but information on how other fungi might respond has been lacking.”

As the planet warms, the impact of extreme weather events—such as storms, droughts, and wildfires—only compounds the situation by creating optimal conditions for fungal proliferation. While northern regions of Europe may now face an increased risk, some areas in Africa might become uninhabitable for certain fungi. However, due to fungi’s remarkable adaptability and resilience, researchers caution that they might thrive in new conditions.

Compounding the threat is the rising antifungal resistance attributed to the overuse of fungicides in agriculture. The efficacy of available antifungal treatments is often compromised by their toxicity, highlighting the immediate need for innovative solutions. As Viv Goosens, research manager at Wellcome, stated, “Fungal pathogens pose a serious threat to human health by causing infections and disrupting food systems. Climate change will make these risks worse.”

Addressing these challenges will necessitate a concerted effort to fill existing research gaps. By utilising models and distribution maps to monitor the movement of fungi, health authorities can better allocate resources and develop effective interventions. The evolving landscape of fungal infections isn’t merely a medical issue but a public health crisis that demands urgent attention and action in the face of climate change.

## Reference Map:

* Paragraph 1 – [[1]](https://www.independent.co.uk/climate-change/news/fungal-infections-disease-temperature-health-europe-b2756620.html), [[4]](https://www.manchester.ac.uk/about/news/climate-change-putting-millions-more-people-at-risk-from-infection-causing-fungi/)
* Paragraph 2 – [[1]](https://www.independent.co.uk/climate-change/news/fungal-infections-disease-temperature-health-europe-b2756620.html), [[2]](https://www.ft.com/content/506f5a03-8520-40e1-aee3-a6e6427f68c0)
* Paragraph 3 – [[3]](https://as.com/actualidad/sociedad/alerta-en-europa-por-un-hongo-potencialmente-mortal-puede-afectar-a-millones-de-personas-n/), [[6]](https://pmc.ncbi.nlm.nih.gov/articles/PMC8151111/)
* Paragraph 4 – [[1]](https://www.independent.co.uk/climate-change/news/fungal-infections-disease-temperature-health-europe-b2756620.html), [[2]](https://www.ft.com/content/506f5a03-8520-40e1-aee3-a6e6427f68c0), [[5]](https://www.cdc.gov/fungal/about/climate-change-and-fungal-diseases.html)
* Paragraph 5 – [[1]](https://www.independent.co.uk/climate-change/news/fungal-infections-disease-temperature-health-europe-b2756620.html), [[3]](https://as.com/actualidad/sociedad/alerta-en-europa-por-un-hongo-potencialmente-mortal-puede-afectar-a-millones-de-personas-n/)

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## Bibliography

1. <https://www.independent.co.uk/climate-change/news/fungal-infections-disease-temperature-health-europe-b2756620.html> - Please view link - unable to able to access data
2. <https://www.ft.com/content/506f5a03-8520-40e1-aee3-a6e6427f68c0> - A recent study warns that climate change is accelerating the global spread of dangerous fungal pathogens, particularly Aspergillus species. Rising temperatures are enabling Aspergillus fumigatus and Aspergillus flavus to expand into northern regions of Europe, Asia, and the Americas. These fungi pose serious health risks, especially to people with weakened immune systems. Aspergillosis, a lung disease caused by inhalation of Aspergillus spores, kills hundreds of thousands annually, with many cases going undiagnosed due to unfamiliarity and symptom overlap with other conditions. A. fumigatus is on the World Health Organization’s list of critical fungal threats and may extend its territory by 77% by 2100, potentially exposing an extra 9 million Europeans. A. flavus, which infects crops and produces aflatoxins causing cancer and liver damage, could spread over 16% more land, raising concerns for both human health and food security. The increase is further amplified by extreme weather events like droughts followed by heavy rain, boosting spore dispersal. Despite the mounting threat, investment in antifungal treatments remains limited due to high costs and low profitability. Experts emphasize the urgent need for increased research and public awareness, as fungal diseases are projected to become a growing health crisis under climate change.
3. <https://as.com/actualidad/sociedad/alerta-en-europa-por-un-hongo-potencialmente-mortal-puede-afectar-a-millones-de-personas-n/> - An alert has been issued in Europe due to the increase in cases of aspergillosis, a potentially fatal disease caused by Aspergillus fungi, especially species Fumigatus and Flavus. This infection primarily affects individuals with weakened immune systems, such as transplant patients or those undergoing chemotherapy. The most severe form is pulmonary aspergillosis, which can severely damage the lungs. Climate change, particularly rising temperatures, favors the proliferation of these fungi, along with other factors like compost, pesticides, and resistance to agricultural drugs. It is projected that Aspergillus fumigatus could expand by 77% globally if fossil fuel use continues, and cases of Aspergillus flavus could increase by 16%. Other pathogenic fungi like Candida auris and Coccidioides have also been observed to expand. While most people tolerate spores well, those with pre-existing lung diseases are at high risk of severe and often fatal infections.
4. <https://www.manchester.ac.uk/about/news/climate-change-putting-millions-more-people-at-risk-from-infection-causing-fungi/> - Researchers from The University of Manchester have forecast an increased risk of infection from fungi over the coming years, including a significant spread of certain fungal pathogens across Europe, depending on global actions to mitigate climate change. Under a scenario of continued fossil fuel reliance (SSP585), the spread of Aspergillus flavus could increase by about 16%, putting 1 million more people at risk of infection in Europe. Infections affect the respiratory system, and this fungus infects a broad range of agricultural crops. The predictions also show that the spread of another fungus, Aspergillus fumigatus, could increase by 77.5% and potentially expose 9 million people in Europe. This is a concerning trend due to a rise in antifungal resistance and a severe lack of diagnostics and treatment options for fungal infections.
5. <https://www.cdc.gov/fungal/about/climate-change-and-fungal-diseases.html> - Climate change poses many threats to biological, ecological, and societal systems. Shifting temperatures and weather patterns over time are changing the environment and fungal habitats. The impact of climate change on fungal infections is not fully understood due to a lack of data. However, there are several ways that environmental changes can transform fungi, where fungi live, and its interactions with other living things. Rising temperatures and extreme weather events may impact fungal disease spread. Changes in climate and weather patterns cause fungi to adapt over time. Some disease-causing fungi may start to live in expanded geographic areas that become suitable environments for their survival. New types of fungal infections can emerge if fungi adapt to warmer temperatures and can survive in and infect the human body. There is still a lot to learn about the potential impact of climate change on fungal diseases.
6. <https://pmc.ncbi.nlm.nih.gov/articles/PMC8151111/> - Climate change will have a drastic impact on the way we farm. It is estimated that 40% of land is used for agriculture, and this is still increasing. More intense agricultural activities can alter microbial diversity. Environmental factors are known to influence plant pathogens and impact the effectiveness of chemical treatments. This will lead to different pesticide strategies; either using increased concentrations or multiple applications of pesticides. Fungicide usage will change due to climate change as well. As azole resistance is associated with fungicide usage, we may expect increased trends of resistant isolates within the clinic if the use of azoles is expanded. Resistant isolates could subsequently be spread by the aforementioned factors that are likely to be affected by climate change, including air currents, human transmission, transport of agricultural commodities (including flower bulbs), and dispersal by migratory birds. Several species of Aspergillus are able to cause disease in humans, but A. fumigatus is the most common cause of disease. As A. fumigatus is able to adapt to high-temperature stress better than any other member of the species group, one would predict that in hotter environments A. fumigatus would be isolated in patients more than in temperate climates. Indeed, models suggest that continued elevated temperatures lead to replacement of species such as Aspergillus flavus by A. fumigatus. Paradoxically, this does not seem to be the case outside the laboratory. Despite being less thermotolerant than A. fumigatus, A. flavus is a predominant etiological agent for aspergillosis in Asia, the Middle East, and Africa. This highlights that simple lab-based models for thermotolerance do not capture the complex conditions found in the environment. The reasons for the dominance of A. flavus in these regions remain elusive, but it is worrying that A. flavus is considered to be intrinsically resistant to the salvage therapeutic amphotericin B. As there are only three classes of antifungal used to treat aspergillosis, this could severely restrict treatment options. Much is left unknown about how A. fumigatus will adapt to increases in global temperature and consequently, we know little about how these environmental changes will affect the pathogenic potential of this mold.