

Fighting the fungus among us

ASU researchers use environmental factors to predict valley fever spread

By Preesha Kumar , ASU News
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It starts with a spore.

When inhaled, spores of the *coccidioides* fungus can cause coccidioidomycosis — better known as valley fever. The spores may be fungi, but they are no fun.

Valley fever usually causes flu-like symptoms, fatigue and rashes. Severe cases can lead to hospitalization. In 2023, those hospitalizations cost Arizonans \$73.9 million, and the illness caused 73 deaths.

Researchers with the [Health Observatory](#), part of [ASU Health](#), are using environmental data to help doctors better diagnose and prevent the spread of valley fever. This effort is one of many contributing to the Health Observatory's mission to provide a comprehensive, data-driven understanding of community health to create an equitable, resilient, impactful and cost-effective health care system in Arizona.

[Dave Engelthaler](#), executive director of the Health Observatory, hopes to revolutionize how we approach health data.

"Whether that's decision-makers or the general public, how can they best absorb and understand this new health information to make better decisions?" he asks.

Airing out Arizona's illness

Engelthaler, who heads the valley fever project, says the disease is Arizona's illness. The vast majority of cases occur in just a few states: Arizona, California, Nevada, Utah and New Mexico. But Arizona reports the highest numbers of cases by far, according to the [Centers for Disease Control and Prevention](#).

While more widespread illnesses, such as Lyme disease, attract more federal funding, valley fever receives fewer resources due to its concentration in the Southwest. To Engelthaler, this highlights the importance of conducting local research to create long-term, region-specific health solutions.

The study is built off of data from [Translational Genomics Research Institute](#), better known as TGen, an Arizona nonprofit that analyzes genetic components of rare disorders and cancer. Engelthaler is the director of the Division of Immunology and Microbial Genomics at TGen, where he headed a multi-institutional [study](#) analyzing coccidioides spore count in air filters across the Phoenix metro area in 2024.

Contrary to popular belief, the team did not find an increase in airborne spores after dust storms. They did find an increase in spores on hotter, dryer days with high wind speeds. They also found that spores were not evenly spread out through the Valley.

Engelthaler hopes to use this data as a jumping-off point to collect and map the spread of valley fever, including analyzing the environmental influences of construction and using public health to develop local interventions. To do this, he wants to use new technology, such as artificial intelligence and advanced analytics, to create a multimodal map of risk. He says these analyses can help us understand what's going on within a patient and an environment, which can predict the direction of an illness.

Additional data points can help diagnose valley fever itself. Due to the similarity of symptoms, valley fever is often misdiagnosed as pneumonia. Understanding where and how valley fever spreads and infects people could help with faster and more accurate diagnoses.

“If a small fraction of people have symptoms that are even showing up and being registered into the medical system, we really can't learn very much about the overall system,” says Engelthaler.

The research world has consistently focused on treating illness rather than understanding how people get infected. Engethaler says the health problem begins with the pathogen — its natural history and how it's dispersed and distributed.

Ratting out valley fever

Nathan Upham is an assistant professor in the [School of Life Sciences](#), part of [The College of Liberal Arts and Sciences](#), and a senior Global Futures scientist. He's an evolutionary ecologist who focuses on how species, environments and pathogens interact over time. Upham has planned a new study with Engelthaler to use rodent populations as a predictor for valley fever risk areas.

Upham says the current explanation for how valley fever spreads ignores rodents entirely, focusing on wind events instead. While rodents cannot directly infect people with valley fever, they can carry it in their lungs. This doesn't pose much of an issue until the rodent dies underneath the soil, where the fungus can take over the dead animal and spread. Upham says the missing piece to the puzzle could be what's going on underneath our feet.

He will conduct quarterly surveys of wild rodents at eight sites across the Phoenix metro area. By taking blood samples, analyzing lung tissue and sequencing DNA, his team can see if there are relationships between the fungi and rodent species. DNA can reveal if a rodent carries a gene only found in fungi, which can improve models of disease risk.

“If we find the natural host of the fungi, we can figure out what environment it typically interacts with. Then we can relate those environments to human activity. Where are the construction sites? Where have they been digging? Where are the newer housing developments? These areas may

have higher risk for valley fever,” says Upham.

Painting a new picture for health data

In addition to solving pressing health care challenges, the Health Observatory is searching for new ways to communicate its findings. Engelthaler hopes to integrate the arts and the humanities to communicate to the public, noting that he believes public health communication failed during the pandemic when it should have shined.

“We didn't do a good enough job communicating upfront on how information's going to change,” says Engelthaler.

Engelthaler hopes to improve such communication with new methods to translate findings to the public. By partnering with the [Herberger Institute for Design and the Arts](#) and the [Decision Theater](#) to create what he calls “the knowledge experience,” he wants to merge psychology, interactive displays and art to make health data more accessible, understandable and approachable for Arizonans.

“Most people are not data geeks like myself. They don't want to just look at static dashboards with bar graphs and line graphs. So we have to understand that mentality,” he says.

More on ASU Health and the Health Observatory at ASU

[ASU Health](#) represents a new approach to advancing health at a university, transforming how health care is designed, delivered and measured while producing new physicians, nurses, specialists and scientists. It is both a center for learning and a resource for the state of Arizona, home to a new kind of medical school that combines medicine and engineering, a new school for public health technology, and a health observatory that provides information to help people make decisions for themselves and their families.

The [Health Observatory](#) at ASU looks at the health of Arizonans to prepare our state to track information, identify trends and serve as an early warning system for public health. As a part of ASU Health, the Health Observatory provides a comprehensive, data-driven understanding of community health to create an equitable, resilient, impactful and cost-effective health care system. Its work delivers medical innovation and helps to detect, respond to and prevent emerging health threats.

This approach provides the information needed to enable the community to take action quickly. It is another way that ASU Health will improve health outcomes for Arizona and one that can also be shared nationally to help leaders across the country make more informed public health decisions when and if conditions warrant it.

This story originally appeared on [ASU News](#).

Main image

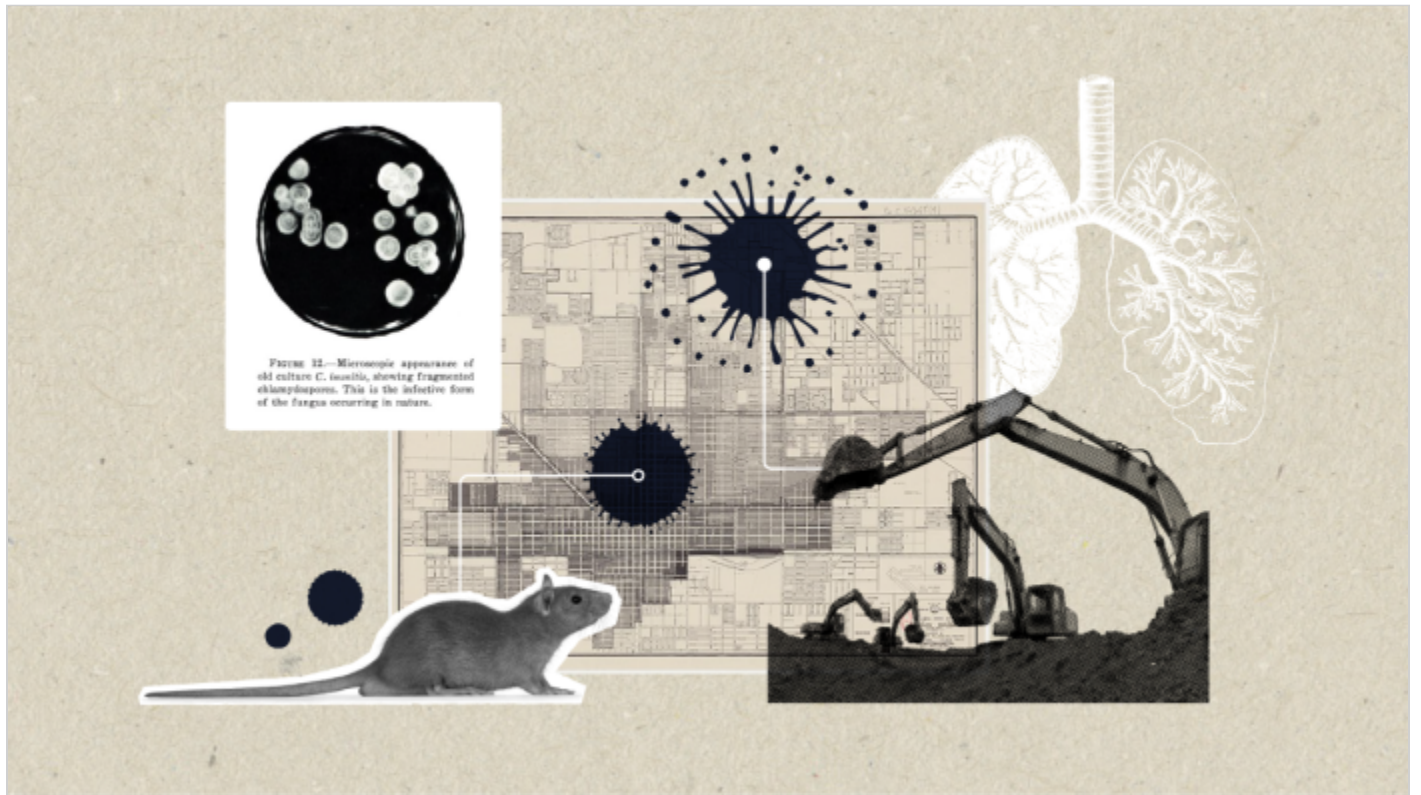


Illustration by Andy Keena/ASU