

Subject: UCAR News - Weather Forecasts Target Meningitis Epidemics
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UCAR Weather Forecasts Aim to Reduce African Meningitis Epidemics

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BOULDER--The University Corporation for Atmospheric Research (UCAR), working with an international team of health and weather organizations, is launching a project this month to provide long-term weather forecasts to medical officials in Africa to help reduce outbreaks of meningitis. The forecasts will enable local health providers to target vaccination programs more effectively for this deadly disease, which is correlated with dry and dusty conditions.

"We're applying our expertise in weather forecasting to assist health care officials on the front lines of this disease," says Rajul Pandya, director of UCAR's Community Building Program. "By targeting forecasts in regions where meningitis is a threat, we may be able to help vulnerable populations. Ultimately, we hope to build on this project and provide information to public health programs battling weather-related diseases in other parts of the world."

Funding for the project comes from a \$900,000 grant from Google.org, the philanthropic arm of the Internet search company. The award is part of the Google.org Predict and Prevent program, which aims to help map "hot spots" of emerging infectious diseases around the world. The project draws on forecasting and health experts at the National Center for Atmospheric Research (NCAR), which is managed by UCAR.

UCAR is working with a number of organizations on the initiative, including leading African health and weather centers and Meningitis Environmental Risk Information Technologies, a consortium of climate and health institutions under the auspices of the World Health Organization. Other partners include the International Research Institute for Climate and Society at Columbia University, North Carolina State University, and the World Meteorological Organization.

-----Africa's meningitis belt -----

Epidemics of bacterial meningitis break out periodically across sub-Saharan Africa's so-called meningitis belt, which stretches across the continent from Senegal to Ethiopia. The disease affects the meninges, the thin linings that surround the brain and spinal cord, and is often fatal. In Africa, more than 250,000 people fell ill and 25,000 died in 1996 and 1997 in the world's largest recorded outbreak of epidemic meningitis.

The epidemics usually end with the onset of the summer rainy season. Researchers are uncertain why dry and dusty conditions are correlated with the disease. Some theorize that it may have to do with the mucous linings in people's respiratory systems becoming irritated by the dusty conditions. Others suspect changes in social behavior: residents tend to stay indoors during the dusty season, facilitating the spread of the disease.

Health clinics in the meningitis belt are planning to turn to a new vaccine, known as conjugate A, to try to reduce disease transmission. But they are limited by the number of vaccines that have been manufactured and the logistical difficulties in trying to reach populations in remote areas. The weather forecasts will enable them to focus on regions that are most at risk while pulling back from areas that are about to get rain.

"Working closely with both the meteorologists and local public health officials will allow us to more effectively target vaccines to at-risk populations in areas with limited resources," says Mary Hayden, a medical anthropologist at NCAR.
-----Predicting the rain -----

Over the next year, the project leaders will focus on Ghana, a country hard-hit by meningitis outbreaks in the past and one where UCAR has contacts in the meteorological and public health communities. They will seek input from local officials in designing the forecasts to be as useful as possible in vulnerable areas.

NCAR meteorologists will begin issuing 14-day forecasts of atmospheric conditions in Ghana in 2009 by analyzing computer models run by such agencies as the European Centre for Medium-Range Weather Forecasts and the U.S. National Centers for Environmental Prediction. To make reliable predictions, they will use statistical techniques to zero in on the meningitis belt, giving greater weight to models that generate the most accurate forecasts under specific conditions. The forecasters will also look at upper-atmospheric patterns that could indicate the impending start to the rainy season.

During the subsequent two years, UCAR plans to work closely with health experts from several African countries to design and test a decision support system that will provide health officials with useful meteorological information. One of the biggest challenges will be to disseminate the forecasts to health officials on the ground.
"We can certainly generate forecasts using the latest technologies, but the goal is to get that information to the people who need it in time for them to use it," Pandya says. "If we can make that happen, this system has significant potential to save lives."

The University Corporation for Atmospheric Research is a consortium of more than 70 universities offering Ph.D.s in the atmospheric and related sciences. UCAR manages the National Center for Atmospheric Research (NCAR), which is sponsored by the National Science Foundation.

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