Health & Medicine

Disease Catchers

Are humans becoming more vulnerable to strange illnesses?

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Livestock production in densely populated areas has contributed to the spread of new infectious diseases around the world, say Columbia scientists.

New diseases seem to have cropped up with frightening regularity in recent decades. Consider AIDS, Ebola, West Nile virus, SARS, and avian influenza. Are we becoming more vulnerable to strange illnesses?

An international team of researchers has conducted the largest analysis of emerging diseases to date and confirmed that humans are increasingly at risk. The researchers, among them Columbia geospatial data expert Marc Levy, examined medical literature published between 1940 and 2004 and counted 335 new infectious diseases. The rate of new diseases quadrupled during that period.

The increase resulted primarily from human encroachment into wilderness areas, the researchers say. Rapid population growth caused large numbers of people to move into regions of India, China, sub-Saharan Africa, Germany, and southern England that are relatively warm and get lots of rainfall. These areas tend to be rich in biodiversity and to breed many pathogens. The majority of the new diseases are caused by bacterial and viral infections that spread from wild animals to humans.

“As people move into wilderness habitats, wild animals are being crowded into smaller areas and mixing with people,” says Levy. This has enabled diseases like SARS, which is believed to have originated in bats, to jump to humans. Large-scale livestock production in densely populated areas is also dangerous, likely explaining the spread of avian influenza in Southeast Asia, says Levy.

In order to identify the global regions that are most susceptible to emerging diseases, the scientists pulled off a sophisticated trick of data analysis. First, they plotted where all of the 335 new diseases were detected. But there was a problem: Emerging diseases tend to be identified in cities with the best medical resources, such as New York, Los Angeles, London, and Tokyo. To control for this reporting bias, the researchers considered the home institution of every scientist who wrote a paper in the prestigious Journal of Infectious Diseases since 1973.

“That gave us an idea of every country’s ability to identify a new infectious disease,” says Levy, who is associate director of Columbia’s Center for International Earth Science Information Network (CIESIN), which is part of the Earth Institute. “Then we were able to accurately measure the impact of other factors, like population density and biodiversity. Those two factors ultimately proved most important in determining a region’s susceptibility to emerging diseases.”

There were other causes: About 20 percent of the diseases resulted from microbes that became deadly in part as the result of overuse of antibiotics, the researchers reported in the journal Nature earlier this year. The data also revealed a peak in the 1980s, which Levy says likely was related to AIDS, which made people vulnerable to

additional diseases. “You had millions of people suddenly with suppressed immune systems,” he says. “So a bunch of new diseases took root.”

For the project, Levy analyzed global census information that CIESIN has collected; his collaborators at the Zoological Society of London and the New York–based Wildlife Trust examined the medical literature. The paper’s coauthors include CIESIN researchers Deborah Balk and Peter Daszak.

The scientists hope the findings will prompt Western nations to give more aid to developing countries for disease-detection systems. “At a global level, we need to redistribute resources for disease monitoring to places like Southeast Asia, Nigeria, and the Congo,” says Levy. “That’s not happening right now. But if rich countries help the poorer ones, diseases might be spotted before they become devastating.”

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