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Dr Daszak is a member of the Institute of Medicine's Forum on Microbial Threats, and served on the IOM Committee on global surveillance for emerging zoonoses, the NRC committee on the future of veterinary research, the International Standing Advisory Board of the Australian Biosecurity CRC, and he has advised the Director for Medical Preparedness Policy on the White House National Security Staff on global health issues.

Dr Daszak won the 2000 CSIRO medal for collaborative research on the discovery of amphibian chytridiomycosis and is Editor-in-Chief of the journal Ecohealth. He has authored over 150 scientific papers, and his work has been the focus of extensive media coverage, ranging from popular press articles to television appearances.

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IS TECHNOLOGY OR FAILURE OF THE IMAGINATION

the Bigger Challenge for Disease Detection?

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ABSTRACT

The biggest challenge for disease detection is neither failure of the imagination nor failure of technology, but the failure of public health agencies to rapidly adopt new technologies and bring creative ideas into their on-the-ground programs. For example, there is a growing body of knowledge on the process of disease emergence that gives us a predictive capacity to deal with emerging pathogens. We now know that majority of emerging diseases are zoonotic; we know that most emerge due to economic development: land use change, agricultural expansion, international travel and trade, changes to food production etc. We can predict the future trends in these underlying drivers, and future trends in how people make contact with livestock and wildlife (via road building, logging concessions etc.). Yet, despite these advances, public health agencies still adopt a 'sit and wait' policy – mobilizing resources when new diseases emerge, and using emergency powers to deal with them. This is an oversimplification, of course, and there are notable exceptions, e.g. efforts to deal with H5N1 spillovers by increasing farm biosecurity, or predictive modeling of future

Rift Valley fever outbreaks. However, the critical point is that global public health is not yet working proactively enough to deal with emerging disease threats as they begin, or even before.

WHY IS THIS?

I propose that the problem begins with infectious disease and public health research. Here, the focus is probably weighted too much towards expensive molecular biological tools for diagnostics or vaccine production, and ignores the potential gains from research into the underlying process of disease emergence. There has yet to be developed a coordinated research strategy to understand how, for example, land use change leads to the emergence of a novel zoonotic virus, or how human behavior within a network of hunting, agriculture and globalized trade drives pandemic risk. Similarly, there is a lack of imagination and ambition in how Public Health Agencies have adopted the One Health mantra of environment/wildlife-livestock-human connections. How many public health agencies employ or collaborate with

ecologists to analyze where wildlife are making the most contact with people within their country?

HOW COULD A PUBLIC HEALTH AGENCY ADOPT THIS APPROACH?

1. Allocate resources for disease detection and control specifically to the regions with the highest risk of an outbreak or disease emergence (emerging disease 'hotspots'). For example, where new roads are being built into forests, funds could be allocated to clinics not only detect known zoonoses, but to conduct limited pathogen discovery and identify novel pathogens as they first emerge.
2. Work with social scientists that can identify high-risk human-activities within a country and target these populations for intensive syndromic surveillance and attempt to clear up outbreaks of unknown etiology
3. Adopt a true One Health approach involving work with veterinarians to strategically sample wildlife that have a high likelihood of harboring known or future zoonoses, and to collaborate with ecologists to identify when these wildlife populations are undergoing changes to their population dynamics which make them higher risk for novel outbreaks.
4. Identify ways to modify high risk behavior that are culturally acceptable; e.g. finding alternative sources of protein to bushmeat, identifying alternative, low risk places in which to hunt, and supporting efforts to deal with exposure at the farm and slaughterhouses in hotspot countries.
5. Collaborate with agencies that deal with the primary drivers of emerging diseases such as extractive industries, agriculture, finance ministries, etc. to identify alternatives to these activities.

Ultimately emerging infectious are a product of economic and social development and it is neither practical nor ethical to say we should not expand agriculture or develop our land. But here, the failure of imagination is to not look for alternatives. Future public health strategies will need to bring creative minds from a wide diversity of fields to identify ways through which we can continue to develop economically, but reduce our footprint and the risk of future pandemic. This will include identifying novel ways to fund these programs collaboratively among public and private sectors.