RSIS S. RAJARATNAM SCHOOL OF INTERNATIONAL STUDIES
Nanyang Technological University, Singapore

RSIS COMMENTARY

www.rsis.edu.sg No. 007 – 9 January 2024

RSIS Commentary is a platform to provide timely and, where appropriate, policy-relevant commentary and analysis of topical and contemporary issues. The authors' views are their own and do not represent the official position of the S. Rajaratnam School of International Studies (RSIS), NTU. These commentaries may be reproduced with prior permission from RSIS and due credit to the author(s) and RSIS. Please email to Editor RSIS Commentary at RSISPublications@ntu.edu.sg.

Facing Up to Climate Change-Induced Biosecurity Threats

By Jose M. L. Montesclaros and Mely Caballero-Anthony

SYNOPSIS

Naturally occurring biosecurity threats from climate change-induced zoonotic diseases are anticipated to pose as serious a public health risk as threats from lab-grown pathogens. Deeper knowledge and awareness of these climate-induced diseases will help the international community including the ASEAN member states to better deal with these emerging biosecurity risks.

COMMENTARY

While weaponised pathogens developed in laboratories present significant biosecurity risks, equally important is the emergence of naturally occurring diseases and the inability of public health systems to address them. Indeed, at the beginning of the 21st century, it was estimated that diseases which pass from animals to humans, i.e., "zoonotic diseases", accounted for a disproportionately large share of emerging infectious diseases (EIDs).

Within ASEAN, regional action plans exist, such as the 2021 ASEAN Strategy for Exotic, Emerging, Re-emerging Diseases and Animal Health Emergencies, which recognises that animal disease outbreaks can potentially lead to the "risk of public health emergencies". However, one study that tracks the global progress of EIDs has noted that "Our understanding of the interactions between ecosystem change, disease regulation and human well-being (…) is in its infancy".

This commentary highlights key research gaps existing globally and the implications for ASEAN.

Climate Change-Induced Emerging Zoonotic Diseases

The impact of global climate change on the emergence of zoonotic pathogens is an emerging field of research. Unlike studies of the impact of climate change on the incidence of vector-borne diseases such as dengue and malaria – which have been available since the mid-1990s – it was only in the last decade that climate change scenarios were used to predict the future emergence of zoonotic diseases.

A landmark study in 2001, which focused on zoonotic diseases, provided the "first quantitative analysis identifying risk factors for human disease emergence". Of the 1,415 infectious organisms surveyed which were harmful to humans, the authors found that 61 per cent were zoonotic in nature, and that zoonotic pathogens were "twice as likely to be associated with emerging diseases" relative to their non-zoonotic counterparts.

Disease hotspots were also identified in a 2008 study to locate potential areas for wildlife-originating zoonotic diseases. High-risk areas included densely populated human habitats, where interactions between communities and animals were more likely, as well as those with higher wildlife biodiversity, allowing for a richer breeding ground for EIDs. While such findings leveraged global positioning system (GPS)-tagged data, they did not account for climate scenarios.

It was only in recent years that studies analysed the future emergence of zoonotic diseases premised on climate change/greenhouse gas emission scenarios. One study in 2022, found that even in a scenario where global temperature rise is below 2°C by 2100, there would still be more than 300,000 new interactions amongst different species of wildlife, and 15,000 transmission events across species heading up to 2070. Changing temperatures lead to climate-induced animal movements and habitat changes, with faster rates of movement observed in bats as a key driver for new "first encounters".

Further Uncertainties: Compounded Risks Across Value-Chains

By 2009, the need for more focused support for the study of naturally-occurring zoonotic diseases led to the United States Agency for International Development's (USAID) launch of its 10-year "PREDICT" project to build capacity for EID data collection and analysis across more than 30 countries globally.

The "repeated and unpredictable emergence and re-emergence of high impact viral epidemics and pandemics" led to the Bellagio Initiative on the Global Virome Project in 2016, which sought "to identify and characterise, within a decade, 99 per cent of all zoonotic viruses with epidemic/pandemic potential in order to better predict, prevent, and respond to future viral pandemic threats and to protect us all from their worst consequences".

Significantly, an uncertainty emphasised by the PREDICT consortium is about how value-chains for animal trade (including bats, rodents and primates) can lead to escalating disease emergence. This is due to the increased mixing of live animals and their close proximity with one another at later stages in the value-chain. For instance, the rat trade in Vietnam led to rising proportions of coronaviruses among field rats;

from 20 per cent at the start of the value chain, to 32 per cent in large markets, and 55 per cent upon reaching restaurants.

A further risk, relevant to cities, is how animals have "expanded their range by adapting to human-dominated landscapes", thereby raising virus emergence risks. Future studies will thus need to integrate further spill-overs owing to livestock-wildlife interactions, as well as interactions of wildlife with one another, across the value-chain, alongside climate change.

Implications for ASEAN

The PREDICT project was discontinued in mid-2020 when the world was caught off-guard by the COVID-19 pandemic. ASEAN has since stepped up health protocols for tracking and cross-border information sharing on human-case infection rates for existing diseases.

However, the complex nature of zoonotic diseases requires more foresighted analysis to identify future zoonosis hotspots given climate change and risk-compounding in value-chains. One study in fact noted that "almost 20 years since the threats to conservation and human health that wildlife EIDs represent was first highlighted, there has been little effort to put in place policies to reduce risk to EIDs". A further study found that areas with broadleaf tree cover, cultivated vegetation, and regular flooding, are vulnerable to EID emergence, and are prominent in Indonesia and Malaysia.

The 10-year PREDICT project has helped to strengthen the capacities of countries to track and project future hotspots for the emergence of novel infectious diseases. It has also contributed to regional action plans such as the ASEAN Strategy for Exotic, Emerging, Re-emerging Diseases and Animal Health Emergencies, which require "disclosure of animal disease data and information between ASEAN countries".

Notwithstanding this, it is uncertain whether any of the countries under the PREDICT project will continue with enhanced zoonotic disease surveillance now that the project is no longer in place. Understandably, the lower-income countries are less able to do so given the high costs of operations. Addressing this question entails deeper analysis of country capacities and funding commitments for PREDICT countries (including Cambodia, Indonesia, Laos, Malaysia, Myanmar, Thailand and Vietnam) and non-PREDICT ASEAN countries moving forward.

Jose Ma. Luis Montesclaros is a Research Fellow with the Centre for Non-Traditional Security Studies (NTS Centre), S. Rajaratnam School of International Studies (RSIS), Nanyang Technological University (NTU), Singapore. Mely Caballero-Anthony is Professor of International Relations, Associate Dean (International Engagement) at RSIS, and Head of the NTS Centre. They are part of the team of a new research programme on biosecurity to be launched in 2024.