



A Critical Infrastructure Approach to Mitigating Future Pandemics in Southeast Asia

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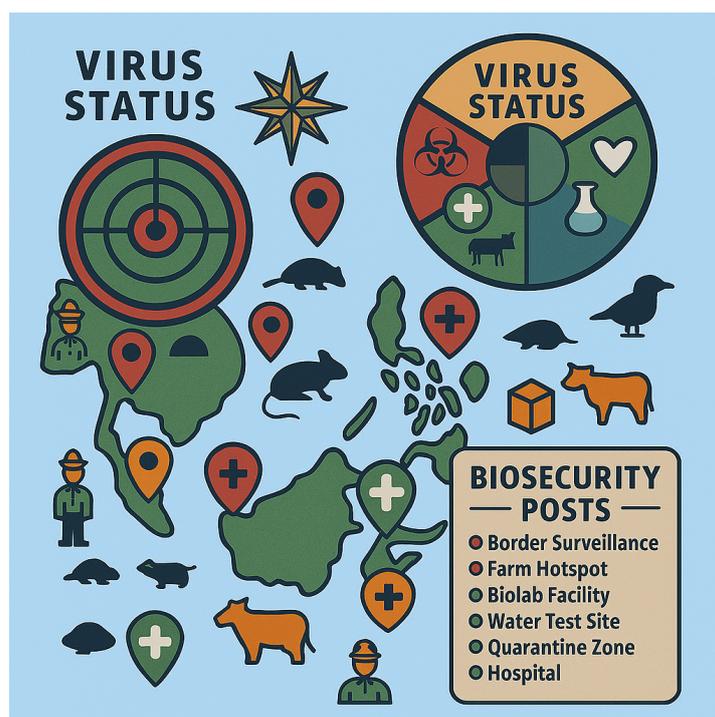
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Executive Summary

Southeast Asia is a growing hotspot for emerging and re-emerging biosecurity threats, given the impacts of climate change on animal migration, triggering animal disease evolution into forms that impact human health (zoonosis). The region faces multiple vulnerabilities in the form of unregulated shared borders, trade and transport infrastructure for animal markets, biotechnology labs, and farms, which this policy report treats as the critical infrastructure (CI) for diseases to develop/enter ASEAN member states.

This policy report proposes a preventative CI protection approach to governance, in mitigating the emergence/re-emergence of infectious diseases. Policy recommendations include implementing integrated national surveillance and warning systems; exploring cooperative border governance mechanisms towards a fully fledged ASEAN centre for disease control and prevention; and developing collaborative hubs for regional research, cross-sector capacity-building, and public-private partnership practices. A CI approach presents a holistic approach to biosecurity, complementing existing whole-of-government approaches by prioritising the tackling of potential blind spots as bases for regional cooperation.



Creative depiction of biosecurity surveillance in Southeast Asia, created by authors using Microsoft Copilot on 29 October 2025.

Critical Infrastructure and Biosecurity Threats

The global vulnerability to emerging and re-emerging diseases has grown significantly over recent decades, presenting significant biosecurity threats. These can be observed with the evolution of the severe acute respiratory syndrome coronavirus (SARS-CoV). Its earlier variant, SARS-CoV-1 (SARS), was the “first major novel infectious disease to hit the international community in the 21st century”, infecting 8,000 individuals globally, albeit with fewer than 1,000 fatalities, in 2002–2003, mostly within Asia.¹ The later variant, SARS-CoV-2 (COVID-19), developed traits such as a longer delay before fatality, and asymptomatic transmission, allowing it to travel farther and infect more than 770 million people globally (with more than 7 million fatalities) since 2019.²

The COVID-19 pandemic drew attention to how countries could better protect their critical infrastructure (CI) against future pandemic threats.³ CI are “systems and assets, whether physical or virtual, so vital to the (country) that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, of any combination of those matters.”⁴ CI protection seeks to safeguard a country from sector-specific threats that could impact national welfare significantly, as in the case of cyberattacks and terrorist attacks especially after the 9/11 attacks.⁵ CI are not limited to physical infrastructure, but extend to the broader systems of interrelated infrastructure across multiple sectors, whereby “the failure of one infrastructure can have severe and far-reaching impacts on other infrastructures and jeopardize the functioning of the whole system.”⁶

This policy report argues for an approach to CI protection that prioritises preventing future pandemics. CI resilience is commonly attributed to the stability of sectors or infrastructure *in the face of a disruption*, including traits such as robustness (continuous functioning amid shocks); redundancy (having substitute infrastructure); resourcefulness (the ability to swiftly direct resources for shock response); and rapidity (timely restoration of functionality).⁷ Typical CI approaches to pandemics would recommend having spare hospital bed capacity (robustness); alternative transport routes (redundancy); places that are convertible into quarantine areas (resourcefulness); and vaccine development capacities (rapidity). The common approach assumes a pandemic has already emerged, and seeks to minimise its broader national impacts.

¹ WK Lam et al., “Overview on SARS in Asia and the World”, *Respirology* 8 (2003): 1, <https://pmc.ncbi.nlm.nih.gov/articles/PMC7159403/>.

² World Health Organisation (WHO), “WHO COVID-19 Dashboard”, <https://data.who.int/dashboards/covid19>.

³ C. Scholz et al., “The Emergence of New Critical Infrastructures: Is the COVID-19 Pandemic Shifting Our Perspective on What Critical Infrastructures Are?” *Int J Disaster Risk Reduct.* 83: 103419 (2022), <https://pmc.ncbi.nlm.nih.gov/articles/PMC9633617/>.

⁴ Cornell Law School, Legal Information Institute, “42 U.S.C. 5195c – Critical Infrastructures Protection”, part e, <https://www.law.cornell.edu/uscode/text/42/5195c>.

⁵ J. Harašta, “Legally Critical: Defining Critical Infrastructure in an Interconnected World”, *International Journal of Critical Infrastructure Protection* 21, C (2018): 47–56, <https://doi.org/10.1016/j.ijcip.2018.05.007>.

⁶ C. Scholz et al., “The Emergence of New Critical Infrastructures.”

⁷ F.D.P. Petit et al., “Resilience Measurement Index: An Indicator of Critical Infrastructure Resilience”, Argonne National Laboratory (ANL), Argonne, Illinois (USA), April 2013, <https://publications.anl.gov/anlpubs/2013/07/76797.pdf>.

By contrast, a preventative approach to CI protection seeks to reduce the likelihood of pandemics emerging in future as well as their entry into a country in the first place. This report focuses on Southeast Asia where this approach is relevant, given the emergence in recent decades of numerous novel biological threats from within the region or its neighbours. Diseases that have emerged include zoonotic diseases (which transfer from animals to people) such as the Nipah virus from bats and the H5N1 avian influenza from birds. Re-emerging diseases include vector-borne diseases such as chikungunya fever, dengue and Japanese encephalitis and zoonotic diseases such as rabies (from rabid canines and other animals), streptococcus suis (from pigs), and leptospirosis (from rats).⁸

Southeast Asia is a hotspot for such pathogens given its tropical climate and high biodiversity.⁹ Climate-induced zoonosis is a significant challenge, as climate changes alter animal migration patterns and bring humans into closer contact with wildlife.¹⁰ Altered distributions of disease carriers or vectors such as mosquitoes and rodents, contribute to zoonotic disease emergence/re-emergence and transmission.¹¹ Yet, relative to developed regions such as Europe and North America, there is scarce research and disease surveillance efforts in Southeast Asia, where developing countries predominate.¹² A preventative CI approach therefore provides a means of focusing and prioritising limited resources in safeguarding the region against future biosecurity threats. The next section summarises ASEAN's landscape of CI vulnerabilities and inter-dependencies, across sectors such as healthcare, security, trade, and agriculture, recognising that each sector plays a critical role in detecting, responding to, mitigating, and preventing the emergence and spread of future catastrophic biological incidents. It concludes with policy recommendations for Southeast Asian countries to collectively protect their infrastructure to guard against future biological threats, at cross-sector intersections that can be pathways for disease emergence or re-emergence. The findings and policy recommendations in this report are drawn from interviews conducted as part of the RSIS NTS Centre's participation in the Asia Centre for Health Security as well as analysis of relevant literature.

⁸ R.J. Coker et al., "Emerging Infectious Diseases in Southeast Asia: Regional Challenges to Control", *The Lancet* 377, no. 9765: 599–609, [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(10\)62004-1/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)62004-1/fulltext).

⁹ B.A. Walther, et al., "Biodiversity and Health: Lessons and Recommendations from an Interdisciplinary Conference to Advise Southeast Asian Research, Society, and Policy", *Infection, Genetics and Evolution* 40 (June 2016), <https://www.sciencedirect.com/science/article/abs/pii/S156713481630034X>.

¹⁰ The World Economic Forum, "Here's How Extreme Weather Is Affecting Animal Migration", 5 October 2023, <https://www.weforum.org/stories/2023/10/climate-crisis-impacting-animal-migration/>.

¹¹ Walter Leal Filho, et al., "Climate Change and Zoonoses: A Review of Concepts, Definitions, and Bibliometrics", *International Journal of Environmental Research and Public Health* 19, no. 2 (14 January 2022), <https://pmc.ncbi.nlm.nih.gov/articles/PMC8776135/>.

¹² Kate E. Jones et al., "Global Trends in Emerging Infectious Diseases", *Nature* 451, no. 7181 (2008): 992, <https://www.nature.com/articles/nature06536>.

CI Vulnerabilities for Disease Emergence/Re-emergence in Southeast Asia

The following are the key CI vulnerabilities of the region that could trigger the emergence or re-emergence of climate-induced zoonosis.

1. Porous Inter-Country Borders and Illegal Wildlife Trade

Porous geographical borders within Southeast Asia facilitate the cross-border movement of disease-carrying animals. For example, cases of rabies transmission by stray dogs and anthrax outbreaks in cattle have been reported along the borders of Malaysia, Thailand, and Laos.¹³ The movement of infected livestock often goes undetected due to limited surveillance and weak enforcement. Similarly, trade and transportation, including wild animal trade/markets, can inadvertently serve as pathways for the rapid spread of infectious agents. For example, a wet market in Wuhan, China, was speculated to be a potential hotspot for COVID-19 transmission, though the actual host has yet to be identified.¹⁴

Southeast Asia is also a global hub for legal and illegal wildlife trade, with much of it operating in informal or poorly regulated markets.¹⁵ Unsafe live animal storage, combined with the region's status as a biodiversity hotspot, creates ideal conditions for zoonotic spillover events.¹⁶ Live animal markets, deforestation, and habitat encroachment increase human-wildlife contact, raising the risk of emerging or re-emerging pathogens. Wet markets, often poorly regulated, can act as amplifiers for zoonotic outbreaks, as seen with the outbreak of the H5N1 bird influenza.¹⁷

2. Zoonotic Spillovers in Farms and Food Establishments

While many ASEAN states depend heavily on agriculture for livelihoods and export earnings, the food and agricultural sectors also pose vulnerable points for zoonosis owing to the poor implementation of biosecurity measures. For example, Cambodia saw a rise in backyard poultry farming practices owing to pandemic-induced job losses. Anecdotal evidence showed limited adoption of preventative practices owing to a lack of awareness, education and resources in implementing them. The lack of preventative

¹³ AP News, "Thailand Steps Up Border Control of Livestock after Anthrax Outbreak Is Reported in Neighbouring Laos", 29 March 2024, <https://apnews.com/article/thailand-laos-anthrax-outbreak-dc2677d76a1788b29663610e01081065>.

¹⁴ Alonso A. Aguirre et al., "Opportunities for Transdisciplinary Science to Mitigate Biosecurity Risks from the Intersectionality of Illegal Wildlife Trade with Emerging Zoonotic Pathogens", *Frontiers in Ecology and Evolution* 9 (2021): 604929, <https://doi.org/10.3389/fevo.2021.604929>.

¹⁵ Jeselyn, "Beyond Borders: Navigating Biosecurity in Southeast Asia", NTS Bulletin, RSIS, 19 February 2024 <https://rsis.edu.sg/rsis-publication/rsis/nts-bulletin-february-2024/>.

¹⁶ Ali T Khalil, et al., "Preemptive and Proactive Strategies for Food Control and Biosecurity", *Food and Safety Preservation* 20 (2018): 39–58, <https://pmc.ncbi.nlm.nih.gov/articles/PMC7150240/>.

¹⁷ R.G. Webster, "Wet Market – A Continuing Source of Severe Acute Respiratory Syndrome and Influenza?" *The Lancet* 363 (9404), January 2004, pp. 234–236, [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(03\)15329-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(03)15329-9/fulltext).

measures opens the way to accidental spillover infections, where new infected animal species infect the rest of the animals in the farm.¹⁸

Another study in Vietnam found that coronavirus infection rates in field rats increased as they moved through the food supply chain, from traders to restaurants. This increase was linked to poor storage conditions, where the rats were kept in close proximity to infected bats.¹⁹ Zoonotic spillovers can also occur in the food preparation phases.²⁰ For instance, human exposure to primate blood when preparing monkey meat for human consumption, was one of the potential zoonotic touchpoints for HIV spillovers from infected monkeys to humans.²¹

3. Laboratory-based Accidents and Deliberate Disease Development

Although the biotechnology sector has been growing amid Southeast Asia's ageing population and the hype owing to the COVID-19 pandemic, this sector too can be a CI vulnerability owing to the potential dual uses of biotech innovations. The biotechnology sector, projected to grow at a compound annual growth rate of 12.07% from 2025 to 2033,²² is meant to address the health-related vulnerabilities of individuals above 60, whose share in ASEAN's population is set to almost double from 12% in 2024 to 23% in 2050.²³

Yet, novel emerging threats may emanate from this sector, if the research on zoonotic viruses is misused, such as when pathogens' transmissibility/virulence are enhanced in the process of discovering novel vaccines for future threats, and when viruses are released through laboratory accidents, or used for biocrime and/or bioterrorism.²⁴ Such research, intended for clear benefit but which could easily be misapplied to do harm, is widely recognised as dual-use research of concern (DURC).²⁵

¹⁸ S. Hyder et al., "Influx of Backyard Farming with Limited Biosecurity due to the COVID-19 Pandemic Carries an Increased Risk of Zoonotic Spillover in Cambodia", *Microbiology Spectrum* 11, no. 1 (2023): e04207–22, <https://pubmed.ncbi.nlm.nih.gov/36515551/>.

¹⁹ Q.H. Nguyen et al., "Coronavirus Testing Indicates Transmission Risk Increases along Wildlife Supply Chains for Human Consumption in Viet Nam, 2013 –2014", *PLoS One* 15, no. 8 (2020): e0237129, <https://doi.org/10.1371/journal.pone.0237129>.

²⁰ J. Ellwanger and J.A.B. Chies, "Zoonotic Spillover: Understanding Basic Aspects for Better Prevention", *Genetics and Molecular Biology* 44, no. 1 Suppl 1 (2021): e20200355, <https://pmc.ncbi.nlm.nih.gov/articles/PMC8182890/>.

²¹ B.H. Hahn et al., "AIDS as a Zoonosis: Scientific and Public Health Implications", *Science* 287, no. 5453 (2000): 607 –614, <https://pubmed.ncbi.nlm.nih.gov/10649986/>.

²² IMARC Group, "South East Asia Biotechnology Market Report and Industry Forecast", <https://www.imarcgroup.com/south-east-asia-biotechnology-market> (accessed 20 October 2025).

²³ WHO Southeast Asia, *WHO South-East Asia Regional Strategy on Healthy Ageing 2024–2030* (WHO, Bangkok, 2025).

²⁴ M. Caballero-Anthony, Jose M.L. Montesclaros, Julius C. Trajano and Jeselyn, "Dual-Use Research of Concern Landscape in Southeast Asia: Prioritization, Gaps, and Challenges", *Applied Biosafety* 30, no. 2 (5 June 2025). <https://doi.org/10.1089/apb.2024.0055>.

²⁵ WHO, "What Is Dual-Use Research of Concern?" 13 December 2020, <https://www.who.int/news-room/questions-and-answers/item/what-is-dual-use-research-of-concern>.

4. Water-Related Zoonosis amid Rapid Urbanisation

Rapid urbanisation in Southeast Asia strains public water and sanitation systems, which can serve as routes for the spread of zoonotic diseases. Earlier studies found the emergence of leptospirosis (from rats) infecting herds of both grazing beef cattle and wild boar, through water sources,²⁶ as well as the transfer of diseases like diarrhoea-causing *E. coli* from cattle, dogs, pigs, chickens, and deer.²⁷

While drinking water sources should ideally be equipped with treatment facilities, disparities exist in Southeast Asia. Taking the region as a whole, 83.8% have access to safely managed drinking water, but some countries have lagged behind²⁸ owing to lower income levels, as in Cambodia (64.8%) and Laos (77.5%), or rapid urban population growth, as in Indonesia (73.7%). Health risks emanating from urban water infrastructure disparities can be observed. For example, a survey in Yogyakarta showed that 89% of water sources and 67% of household drinking water were contaminated with faecal bacteria, contributing to the spread of illnesses like cholera, dysentery, and typhoid.²⁹ In Cambodia's rural population, persistent diarrhoeal disease remains a leading cause of death among infants and children under five, with 16 deaths per 1,000 live births in 2022.³⁰

²⁶ L. Zamir et al., "The Association between Natural Drinking Water Sources and the Emergence of Zoonotic Leptospirosis among Grazing Beef Cattle Herds during a Human Outbreak", *One Health* 14 (2022): 100372, <https://doi.org/10.1016/j.onehlt.2022.100372>.

²⁷ US Environmental Protection Agency, *Review of Zoonotic Pathogens in Ambient Waters* (US Environmental Protection Agency, Office of Water, Health and Ecological Criteria Division, 2009).

²⁸ ASEAN Secretariat, "ASEAN Sustainable Development Goals Indicators Baseline Report 2020", <https://asean.org/book/asean-sustainable-development-goals-indicators-baseline-report-2020/>.

²⁹ UNICEF, "Water, Sanitation and Hygiene", <https://www.unicef.org/indonesia/water-sanitation-and-hygiene>.

³⁰ Samnang Um et al., "Child Diarrhoea in Cambodia: A Descriptive Analysis of Temporal and Geospatial Trends and Logistic Regression-based Examination of Factors Associated with Diarrhoea in Children under Five", *MEDRXIV*, 8 May 2025, <https://www.medrxiv.org/content/10.1101/2024.05.08.24307034v1.full>.

Inter-Sector and International CI Governance for Biosecurity Resilience

The proposed preventative approach to governing biosecurity-related CI focuses inter-sector and cross-country collaboration on critical points of intersection where zoonotic diseases could either evolve (through cross-species interaction) or start to infect populations. Healthcare sectors should ideally play a leading role in detecting, monitoring, and controlling infectious diseases, given their expertise and networks in disease surveillance. However, the reach of the healthcare sector is limited because the emergence of climate-induced zoonosis typically involves CI in other sectors.

1. Implement Integrated National Surveillance

Customs and police officials at land or maritime borders could complement the health sector's limited capacities for surveillance of the wildlife trade to detect animals potentially carrying zoonotic diseases. One issue is that these border officials are likely to prioritise surveillance of illegal goods/activities, especially higher-value drugs and money laundering instead. A further technical gap uncovered from our fieldwork is that trade/security officials may be unaware of specific traits to monitor, requiring health sector tools to detect animals with zoonotic potential.

One reference in this regard is the Joint Criminal-Epidemiologic Investigations guidebook launched jointly by the US Centers for Disease Control and Prevention (CDC) and the Federal Bureau of Investigation (FBI)³¹ that includes a glossary for common terms used by both health and security officials and lists of pathogens and toxins to track. Such guidance could be localised for ASEAN countries to set courses of action that both security and health sides officials can adopt to detect the potential for diseases of different threat classifications.

Health sector officials will also need the cooperation of agricultural authorities in preventing farms and food establishments from becoming reservoirs for zoonotic disease emergence. To engender cross-sector collaboration, health sector officials can benchmark with international best practices such as the One Health agenda for identifying sector-specific contributions to zoonotic emergence, put forward in 2023 by a group of researchers writing in the *Globalization and Health* journal³² and the Global Health Security Agenda for rapid detection and control of infectious disease threats, developed by several countries in 2014.³³

³¹ US CDC and FBI, *Joint Criminal and Epidemiological Investigations Handbook*, 2018, <https://www.biosecuritycentral.org/resource/core-guidance-and-recommendations/joint-investigations-handbook/>.

³² C.C. Astbury et al., "Policies to Prevent Zoonotic Spillover: A Systematic Scoping Review of Evaluative Evidence", *Globalization and Health* 19, 82 (2023), <https://doi.org/10.1186/s12992-023-00986-x>.

³³ M.L. Shiferaw, J.B. Doty, G. Maghlakelidze, et al., "Frameworks for Preventing, Detecting, and Controlling Zoonotic Diseases", *Emerging Infectious Diseases* 23, no 13 (2017), <https://doi:10.3201/eid2313.170601>.

2. Explore Developing a Full-Fledged “ASEAN CDC” for Cross-Border Governance

Given the high costs in terms of lives and livelihoods lost once a disease has entered a country and spread throughout the population, there is a common interest among health authorities in regulating cross-border movements of people and animals. Yet, resource limitations can prevent lower-income countries Laos and Myanmar, as well as large archipelagic countries like Indonesia or the Philippines, from effectively regulating their borders.

Southeast Asian countries would need to explore cooperative resource-sharing solutions that foster joint responsibility over tropical diseases. ASEAN’s Centre for Public Health Emergencies and Emerging Diseases (APCHEED), and Strategy for Preventing Transmission of Zoonotic Diseases from Wildlife Trade, among others, can be developed into a full-fledged ASEAN centre for disease control and prevention (CDC). Members of the African Union, for instance, have established an Africa CDC, which has a framework for cross-border surveillance, coordination and information sharing, including border health committees, joint guidelines, action plans, and regional training.³⁴

3. Develop Collaborative Regional Research and Capacity-Building Hubs

It is equally important to address capacity gaps in research on climate-induced zoonoses and emerging and re-emerging pathogens, as well as to level approaches across countries in overseeing biotech research from which novel pathogens may emerge. An ASEAN CDC could contribute to developing collaborative regional research and capacity-building hubs to address these challenges, beyond improving cross-border collaboration in mitigating the emergence/re-emergence of infectious diseases.

Currently, differing institutional arrangements lead to variations in national priorities for regional collaboration; for example, in Indonesia, both the Ministry of Health and Ministry of Foreign Affairs share oversight mandates, while in the

³⁴ The success of the Africa CDC was not without challenges, but its experience can nonetheless prove insightful for the region in strengthening regional biosecurity cooperation. An earlier issue, for instance, was the argument over whether each African Union member state (AUMS) should retain full authority over declaring public health emergencies (see P. Adepoju, “The Fuss over Who Should Declare Public Health Emergencies in Africa”, *Health Policy Watch*, 20 June 2022). Over time, AUMS have still mostly engaged with Africa CDC initiatives, evidenced by the 2019 regional biosafety and biosecurity legislative framework developed in cooperation with AUMS (see T. Maruta et al., “Regional Approach to Strengthening Biosafety and Biosecurity Systems in Africa”, *Global Security: Health, Science and Policy* 8, no. 1 (2023): 2257766). This demonstrates that advisory and capacity-building mechanisms can complement, rather than challenge, national discretion. For ASEAN, which similarly upholds consensus and non-interference, this model offers a useful reference point. Regional biosecurity cooperation can be strengthened through mechanisms similar to the Africa CDC, which allow for sustained peer support, capacity sharing, and voluntary transparency, while fully respecting state sovereignty. For further reference on the Africa CDC, see M. Kangumune et al., “Continental Strategic Framework to Strengthen Cross-Border Surveillance, Coordination and Information Sharing in Africa”, *International Journal of Infectious Diseases* 152, (March 2025; Supplement): 107434.

Philippines, the Department of Science and Technology (DoST) plays a central role.³⁵ Such differences can create fragmentation, especially when there are unclear mandates and differing priorities across agencies, thus hindering interagency coordination. An ASEAN CDC could thus play a crucial role in enhancing coordination and regulation, bridge capacity gaps in surveillance and knowledge sharing, and facilitate evidence-based analysis for improved cross-country coordination and biotechnology oversight.

Regional collaboration should further expand to raising the regional adoption of safe biosecurity practices across sectors, such as infrastructure investment for segregating livestock in farms, separate storage of animals in markets, or the expansion of water treatment capacity. The responsibility will still primarily fall on the state to coordinate and allocate resources, spreading the burden of adopting safer practices across multiple actors impacted. But there is still scope for exploring regional approaches such as best practice sharing in public-private partnerships for sectoral infrastructure upgrading projects. For example, pharmaceutical companies could collaborate with governments to develop vaccines for emerging diseases, while logistics firms could improve food storage and transport practices along supply chains. Technology firms could contribute by developing digital tools for disease surveillance and response planning.

Collaborative hubs can also function as training centres to build local expertise, standardise data collection, and strengthen regional early warning systems by integrating findings into surveillance frameworks and harmonising supply chain protocols at the regional level.

³⁵ Jose M.L. Montesclaros and Mely Caballero-Anthony, “Managing Global Biological Risks: Towards a Security-Health Coordination Framework”, RSIS Commentary, 8 Apr 2025, <https://rsis.edu.sg/rsis-publication/rsis/managing-global-biological-risks-towards-a-security-health-coordination-framework/>.

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Ms Jeselyn is a Research Analyst and member of the Biosecurity Programme at the NTS Centre, RSIS, NTU. She is also Co-Investigator of the “Asia Centre for Health Security” research project, under the Centre’s Biosecurity Programme. She conducts policy analysis on the emerging biosecurity landscape in the Asia-Pacific, the impact of emerging technologies such as artificial intelligence (AI) on biosecurity, and the nexus of climate, peace and security. She holds a Master of Science (MSc) in Asian Studies from RSIS, and a Bachelor of Arts in International Relations from Tokyo International University.



Professor Mely Caballero-Anthony holds the President’s Chair in International Relations and Security Studies at RSIS, NTU, where she also serves as Head of the NTS Centre and Associate Dean for External Engagement. She leads the Biosecurity and International Security focus area at the Asia Centre for Health Security (ACHS), and is the Primary Investigator of the “Asia Centre for Health Security” research project of the Centre’s Biosecurity Programme. Her research focuses on regionalism and multilateralism in the Asia-Pacific, non-traditional security, human security, nuclear security, peacebuilding, and global governance. She has led several global and regional research projects on international security and global governance, and has held key leadership roles in major international networks and institutions, including Secretary-General of the Consortium on Non-Traditional Security Studies in Asia since 2008 and member of the World Economic Forum’s Global Council on Nature and Security and the International Climate Security Expert Network.

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Vision: To be a leading, global-oriented centre for NTS studies and an authoritative source of academic and policy analysis, contributing sustainable and inclusive solution to NTS risks and challenges.

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