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Biosecurity Awareness and Education in Southeast Asia

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SYNOPSIS

ASEAN leaders recognise the critical importance of biosecurity. But there is a need to enhance the security culture and biosecurity awareness among life science, medical, and biotechnology professionals to mitigate the misuse of biological materials.

COMMENTARY

In the 2024 ASEAN leaders' Declaration on Regional Biosafety and Biosecurity, ASEAN member states (AMS) made a collective call for the need to "ensure the provision of necessary human resources for biosafety and biosecurity in a sustainable manner through training, education and certification for all relevant personnel". This new declaration from the ASEAN leaders demonstrates the increasing importance of strengthening biosecurity, together with biosafety, in Southeast Asia.

The region's biosecurity experts pointed out during the 2024 Asia Pacific Biosafety Association (APBA) Annual Biorisk Conference that a key challenge presently faced in most of the Southeast Asian countries is that biosecurity issues remain poorly addressed and underappreciated in the life science and biotechnology communities. There is a lack of awareness and understanding of the potential biosecurity risks associated with dangerous pathogens being used for pandemic research studies and in biological samples inside laboratories.

Enhancing Biosecurity Awareness

Given that Southeast Asia is prone to emerging infectious diseases, the need for robust biosecurity measures has become even more critical. Past outbreaks, such as SARS and H1N1, have demonstrated how diseases can spread rapidly within and across borders. Investing in biosecurity awareness helps to ensure that laboratories

do not become unintentional sources of outbreaks due to leaks of dangerous pathogens.

Improper handling of samples or biocontainment breaches can be mitigated through biosecurity protocols. This is to safeguard against threats like bioterrorism, illicit trafficking of biological materials, and biocrimes, that may lead to the development and use of biological weapons.

Investments can also be directed toward supporting the early detection of potential zoonotic disease outbreaks. Clear funding strategies will ensure that biosecurity remains a priority amidst competing national demands. Singapore provides a good example with its S$15 million Biosurveillance Research Programme under the Research, Innovation, and Enterprise 2025 Plan (RIE2025), which emphasises genomics, disease modelling, and vector biology to strengthen early detection capabilities and develop effective mitigation strategies.

Low biosecurity awareness and the lack of a security culture create security challenges and vulnerabilities in life science and health research laboratories. The AMS will benefit from promoting and developing strict personnel reliability standards in this regard to be rolled out across member states.

Such standards include the comprehensive screening of personnel and compulsory training and retraining of staff. Also important are measures fostering positive workplace cultures, enhancing biosecurity awareness among staff and managers, promoting adherence to security protocols, detecting potential issues early, and preventing accidental releases from laboratories. Maintaining such standards can promote greater accountability for laboratory-related biosecurity within borders and prevent incidents of transnational threats, thus contributing to regional biosecurity.

As life science laboratories are where viruses and biological materials are studied for health research and disease diagnosis, it is crucial to develop a positive security culture. In the absence of a strong security culture, incidents can occur in laboratories with biological samples, including theft, sabotage and intentional release of pathogens that will endanger public health.

Developing a Security Culture

In the recently held 2024 Asian Conference on Safety and Education in Laboratories, laboratory researchers and scientists highlighted the increasing attention and resources being invested in institutionalising a safety culture. Laboratory risks experts and scientists from the region demonstrated the positive impact of measures to develop a safety culture. However, a key gap is the lack of attention to security culture in the life sciences.

Security culture in the life sciences is defined as “an assembly of beliefs, attitudes, and patterns of behaviour of individuals and organisations that can support, complement or enhance operating procedures, rules, and practices as well as professional standards and ethics, designed to prevent the loss, theft, misuse, and diversion of biological agents, related materials, technology or equipment, and the unintentional or intentional exposure to (or release of) biological agents”.

One way to embed a security culture is through leadership-driven initiatives. Laboratory managers and institutional biosecurity committees must lead by example, promoting strict adherence to biosecurity protocols. They can achieve this by implementing regular biosecurity assessments, organising security culture training workshops, and engaging staff in open discussions on laboratory vulnerabilities and solutions. Effective leadership creates a trickle-down effect, fostering a collective sense of responsibility among all staff members.

Embedding a security culture also involves creating accountability mechanisms within laboratories. For example, anonymous reporting systems can be established to allow employees to flag concerns or breaches without fear of retaliation. These systems encourage transparency and ensure that security vulnerabilities are addressed promptly. Additionally, rewarding laboratories that demonstrate exemplary biosecurity practices with recognition or incentives can motivate staff to prioritise security measures in their daily operations.

Significant investments in modern biosurveillance technologies, such as automated monitoring systems and biometric access controls, can significantly reduce the likelihood of unauthorised access or mishandling of pathogens.

At the national level, given the widespread use of life sciences and biological materials for peaceful uses in AMS, it is critical to conduct nationwide awareness-building on biosecurity, ensuring a common standard and understanding of risks beyond biosafety and the laboratory setting.

Cooperation at the Regional Level

In addition to national-level policies, it is essential for ASEAN to promote regional cooperation for biosecurity measures. Cross-border collaboration, such as the sharing of information on biosecurity breaches, emerging biological threats, and best practices, will strengthen regional preparedness.

Regional biosecurity workshops are now conducted regularly to provide a platform for regional exchanges of expertise and for collaboration among scientists, policymakers, and biosecurity professionals to create a safer and more secure biological landscape in Southeast Asia.

One key lesson from nuclear security education networks is the availability of nuclear security training in think tanks and universities (e.g., professional development courses and workshops) intended for the technical staff, engineers, and other professionals working in the nuclear industry. This should be done for biosecurity education, a role which think tanks and educational institutions in the field of biosecurity can undertake.

To advance capacity building, AMS could establish "Regional Biosecurity Centres of Excellence" in collaboration with academic institutions and think tanks. These centres would serve as hubs for training, education, and research on biosecurity.

Programmes could include developing a security culture through laboratory simulations, pathogen risk assessments, and case-based learning to equip

professionals with practical skills. Additionally, these centres could host exchange programmes with international biosecurity experts to facilitate knowledge transfer.

Think tanks could help design risk communication frameworks and develop public information campaigns, while academic experts could evaluate these efforts to ensure they meet regional needs. Universities could also provide educational programmes on biosecurity, laying a foundation for long-term expertise in the field.

Conclusion

There is indeed a need for informing life scientists and emerging researchers – especially in the ASEAN region – about their critical role in enhancing the biosecurity culture and bolstering national and regional capacities against the misuse of biological agents. With a strong biosecurity culture and greater awareness, the region will be able to respond effectively to fast-paced developments related to modern technologies in the life sciences and the evolving geopolitical landscape.

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