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Security Nexus Perspectives

NATIONAL BIODEFENSE STRATEGIES IN SOUTHEAST ASIAN STATES

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Introduction

Emergent infectious diseases are a constant threat to global health security. Southeast Asian (SEA) countries have been particularly vulnerable to infectious diseases due to their geographic location, population density, rapid urbanization, increased development in wildlife areas, and overwhelmed resources. In recent years, the Indo-Pacific region has experienced outbreaks of COVID-19, severe acute respiratory syndrome (SARS), H1N1 influenza, avian influenza, and the Zika virus.[1,2] These outbreaks have highlighted the need for SEA states to have agile national biodefense and biosurveillance systems and strategies. Arguably, the SEA region is now the frontline for fighting emerging infectious disease outbreaks, and there is an urgent need for countries to strengthen national biodefense strategies. To provide a path forward, this paper reviews current strategies, pathogen emergence from SEA neighbors South Asia and China, and potential roles for the military in anticipating and mitigating infectious disease risks.

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Existing Biodefense Strategies in Southeast Asia

Several SEA nations recognized the importance of this issue and invested in the development of biodefense strategies to protect their populations from biological threats. Singapore, for instance, developed a comprehensive national biodefense strategy that includes early detection, rapid response, and effective management of biological threats. This strategy includes establishing a National Centre for Infectious Diseases, a high-level biocontainment laboratory, and a public health emergency operations center.[3]

Thailand developed a national strategic plan for bioterrorism preparedness and response, which includes the establishment of a bioterrorism surveillance system, capacity-building for laboratory and epidemiological surveillance, and training for medical personnel on bioterrorism response.[4]

Malaysia developed a National Disaster Management Framework that includes a bioterrorism response plan. This plan includes the establishment of a national bioterrorism response committee, a bioterrorism surveillance system, and the development of guidelines for laboratory and medical response to biological threats.[5]

The Philippines was the first country in Southeast Asia to adopt national security guidelines for this challenge. It developed a national framework for biosecurity and biosafety that includes the establishment of a biosecurity and biosafety training program, the development of guidelines for laboratory safety and security, and the establishment of a national biosecurity and biosafety oversight committee.[6]

Indonesia established a national committee for biosecurity and biosafety, which oversees the development and implementation of policies and guidelines for the safe handling and transportation of biological agents. In 2020 Indonesia published a five-year National Action Plan for Health Security and announced that a whole-of-government biosafety and biosecurity system was in place for human, animal, and agriculture facilities.[7]

In 2009, the regional body ASEAN (Association of Southeast Asian Nations) ratified an Agreement on Disaster Management and Emergency Response that includes provisions for the prevention and control of infectious diseases.[8]

While not all SEA nations have a specific national biodefense strategy, all have developed related policies and guidelines for surveillance, supporting biosafety, and responding to biological threats. The platform is now in place to scale biodefense in each SEA country and collectively across the region.

Components of a National Biodefense Strategy

Current biosafety and biosecurity plans do not always include a biodefense component or perspective, so care should be taken to ensure the following elements are addressed in any comprehensive national biodefense strategy:

1. Risk Assessment: Conducting risk assessments to identify potential biological threats and vulnerabilities.
2. Early Detection and Surveillance: Developing and maintaining robust surveillance systems to detect outbreaks of infectious diseases at an early stage. This would involve improving laboratory capacity, establishing a network of sentinel surveillance sites, and enhancing the capacity of public health agencies to respond to outbreaks.
3. Laboratory Capacity: Establishing and maintaining high-quality laboratory systems for the identification and characterization of biological agents. Priority should be placed on building laboratory capacity, including training personnel and improving equipment and infrastructure. This would ensure that countries in the region are better equipped to detect and respond to outbreaks of infectious diseases.
4. Medical Countermeasures: Ensuring the availability of medical countermeasures, such as vaccines, drugs, and diagnostics, to prevent and treat infections caused by biological agents.
5. Response Planning and Preparedness: A comprehensive response plan should outline the roles and responsibilities of various agencies involved in the response to an outbreak. The plan also needs to include protocols for managing suspected cases, contact tracing, and providing medical care.
6. Public Health Response: Developing and implementing strategies for the rapid and effective response to biological threats, including the establishment of emergency response plans and the coordination of public health response activities.
7. Biosafety and Biosecurity: Ensuring the safe and secure handling, transportation, and storage of biological agents to prevent accidental release or intentional misuse.
8. Research and Development: Promoting research and development activities to advance the understanding of biological agents and the development of new medical countermeasures.
9. Communication and Information Sharing: Prioritizing the establishment of communication networks between countries in the region would ensure that information on outbreaks of infectious diseases is shared in a timely and efficient manner, allowing for a coordinated response to outbreaks.
10. International Cooperation: Collaborating with other countries and international organizations to strengthen global health security and prevent the spread of biological threats across borders.
11. Education and Training: Providing education and training to enhance awareness of biological threats and build capacity to detect, prevent, and respond to biological threats.
12. Funding and Resources: Ensuring the availability of funding and resources to implement and sustain the National Biodefense Strategy.

Emerging Pathogens from South Asia

SEA nations should make plans to counter emerging disease pathogens from South Asian countries. For example, in Bangladesh and India, infectious diseases can spread rapidly across borders and pose a significant threat to public health and regional security.[9] Bangladesh and India are both densely populated countries with large numbers of people living in poverty, which increases the risk of the emergence and spread of infectious diseases. In addition, these countries have experienced outbreaks of infectious diseases such as tuberculosis, dengue fever, cholera, and COVID-19, which have affected not only their own populations but also those of neighboring countries.

SEA nations are located in close proximity to South Asian countries, and many have large populations and significant trade and travel links with these countries. This means that they are at risk of imported cases of infectious diseases and outbreaks originating from these countries. Therefore, SEA nations must be prepared to detect and respond to infectious disease threats, both domestically and regionally, to prevent the spread of disease and protect the health and security of their populations.

The global spread of drug-resistant tuberculosis (MDR-TB) is a complex issue that involves multiple factors, including the misuse of antibiotics, poor treatment adherence, and inadequate infection control measures.[10] MDR-TB is a significant problem in both South Asia and Southeast Asia, and genomic surveillance has revealed geographic patterns of distribution. However, it is challenging to determine the precise transmission routes and the extent to which the disease is being transmitted between the regions. Nevertheless, it is clear that the emergence and spread of MDR-TB in South Asia pose a significant threat to public health in Southeast Asia, and efforts are needed to improve prevention, detection, and treatment efforts.[11]

To achieve this, SEA nations can work collaboratively with South Asian countries and international organizations to strengthen their public health systems, improve disease surveillance and reporting, increase laboratory capacity, enhance research and development efforts, and promote the sharing of information and resources. These efforts can help to build resilience against emerging disease pathogens and ensure a coordinated and effective response to outbreaks, thereby protecting the health and security of people in the region.

Emerging Pathogens in China

SEA nations should make plans to counter emerging disease pathogens from China. For many natural reasons, China is the largest global disease incubator and preeminent disease disseminator globally.[12] For instance, China was ground zero for Asian Flu in 1957, causing over a million deaths, the Hong Kong Flu in 1968 causing over a million deaths, H5N1 Bird Flu from 1996, SARS in 2002 causing 750 deaths, A-H7N9 Bird Flu in 2017, H1N1 influenza, and SARS-CoV-2 causing 6.9 million deaths. Even when China was not ground zero, the management of African Swine Fever resulted in the disease spreading to many other

countries.[13] All these pathogens can cause severe illness and death, leading to significant public health consequences.

Epidemics have inflicted great harm to human and animal populations with devastating impacts on economies in neighboring countries. However, when it comes to diseases spreading from China across the world, natural causes are far from the only cause since the Chinese Communist Party (CCP) has not been willing to collaborate with its neighbors and the global community in a sincere and transparent manner.[12] When poor governance is combined with SEA's close proximity to China and their connections via trade, travel, and tourism, there is a significant increase in the risk of the spread of emerging disease pathogens from China. SEA countries must be prepared to work together with China and other countries to guard against the emergence of new disease pathogens. China also needs to be willing to work sincerely with other countries to detect, prevent, and respond to epidemics. This cooperative approach is vital to protect public health, maintain global health security, and limit disruption to trade, tourism, and investment, which unmitigated can lead to significant economic losses and social turmoil for all nations.

Countering New Pathogens from other Countries

National biodefense strategies need to focus on several key areas to be effective in limiting the spread of new pathogens from other countries. The backbone of any national plan must be early detection and rapid response, which is critical to limiting the incursion and spread of foreign pathogens. Surveillance systems should be in place to detect pathogen presence at borders or in communities at an early stage to prevent or limit the spread of outbreaks. Surveillance should be backed up by adequate laboratory capacity to enable rapid pathogen identification and genomic analysis to enable a determination of the pathogen's origin. Rapid response teams with adequate resourcing and supplies should be in place to respond quickly to new outbreaks, including providing medical care and sufficient facilities for isolating patients to prevent further transmission.

Wastewater monitoring has proven to be a cheap and effective way to track pathogen presence in communities and can be used to track polio, SARS, JC Virus, HIV, HBV, and emerging viruses, such as parvoviruses, picobirnaviruses, some enteroviruses, and Torque teno virus. One toilet flush containing poliovirus can be detected in a sewage treatment plant for over four days.[14] The use of this method greatly expanded during the COVID-19 pandemic as communities sought to monitor levels of SARS-CoV-2 viruses. This allows for predicting localized outbreaks so that hospitals can be better prepared, and genomic surveillance can be put into place to monitor virus evolution.[15]

Laboratory capacity building is critical to limit the spread of new foreign pathogens. A national biodefense strategy should prioritize the development of laboratory facilities and scientific capacity in the region, including improving equipment and infrastructure, training personnel, and developing diagnostic tests for emerging infectious diseases. This would enable early detection and rapid response to new outbreaks of pathogens. While vaccine development is an essential component of any national biodefense strategy for those countries with the capacity to support it, participation in vaccine development and trials is available

to every country. Developing vaccines for emerging infectious diseases can take time, but a national biodefense strategy should prioritize this effort to ensure that vaccines are available to limit the spread of new pathogens as soon as possible.

Border control and travel restrictions proved to be vital measures in slowing the spread of COVID-19 for many countries. This helped buy time to learn how communities and nations could balance the tension between protecting vulnerable populations and allowing society to function. This was particularly effective for nations that did not have land borders and could maintain strict control over air and sea incursions. A national biodefense strategy should include measures to restrict travel from countries harboring infectious cases during outbreaks of new pathogens. This would involve screening travelers for symptoms of the disease, quarantining those who are infected, and limiting travel to and from affected areas. In the case of COVID-19, this strategy was very successful for many small island nations. However, as the pandemic persisted, defenses faltered and pathogens were able to enter.[16]

Fundamental to any crisis response are effective communication and information sharing. A national biodefense strategy should establish communication channels with other affected nations to exchange information on emerging infectious diseases. This would enable the rapid sharing of information on the spread of new pathogens and the implementation of appropriate response measures. There are several such networks already in existence. One exemplary voluntary network is the Pacific Public Health Surveillance Network (PPHSN), created jointly by WHO and the Pacific Community (SPC) in 1996 and composed of countries and organizations. PPHSN focuses on improving public health surveillance and responding to health emergencies in the Pacific caused by dengue, measles, rubella, influenza, leptospirosis, typhoid fever, SARS, and HIV/STIs, which are all prone to outbreak. This is achieved through fusing health data from Pacific countries, surveillance systems, computer applications, training, and promotion of the network.[17]

Role of the Military

There are several military assets that can be used to support a national center for biodefense and biosurveillance. These assets can provide critical capabilities to detect and respond to biological threats. Firstly, military laboratory facilities can supplement local laboratory capacity by providing access to state-of-the-art equipment and personnel trained in biosurveillance.[18] These facilities can help to develop and validate diagnostic tests for emerging infectious diseases, conduct research on pathogen detection and characterization, and support the production of vaccines and therapeutics. This can be leveraged to support a national center for biodefense and biosurveillance. Military personnel can also provide training and support to civilian organizations on best practices for handling and storing biological agents, implementing biosafety measures, and preventing accidental release of pathogens.

Military intelligence capabilities can be used to support a national center for biodefense and biosurveillance by providing early warning of potential biological threats.[19] Intelligence assets such as surveillance systems, reconnaissance platforms, and human intelligence networks can help identify and

track outbreaks of infectious diseases. Providing critical information on the origin and spread of biological agents and risk to human health is vital to inform proportional response and mitigation measures.

Medical response teams from the military can be deployed by a national center for biodefense and biosurveillance in the event of a biological threat. These centers have the duty of coordinating national or even regional responses. The teams typically provide medical care and treatment to infected individuals, help to isolate and quarantine affected populations, and provide logistical support for the distribution of medical supplies and equipment. For instance, the CDC Global Rapid Response Team can rapidly mobilize to support global public health concerns, both within the U.S. and abroad. Since 2015, it has had over 2,447 total mobilizations.[20] GRRT responses have included cholera, COVID-19, dengue, Ebola, hepatitis A, measles, polio, yellow fever, Zika, famine, mass gatherings, and natural disasters.

In the U.S., the Department of Defense and the Navy are well-positioned to deliver products and scale services. This includes vaccines and medical equipment, services such as injections and treatments, and transportation systems and logistics chains that can easily be scaled up if required.[21] Considerable thought and resources have been devoted to other military roles, such as vaccine development. A suitable approach to implementation is via joint missions involving U.S. Forces as the lead provider in logistical support and training, along with local or international NGO partners and local country medical staff to conduct clinical work when and where most needed. Such strategies, which are built on shared responsibility and buy-in, worked well in tsunami relief efforts at Banda Aceh (via the USNS Mercy) and in flood responses on the South American Coast.

Lastly, militaries have significant logistics and supply chain management capabilities that can be used to support a national center for biodefense and biosurveillance.[22] These capabilities can help to rapidly transport personnel, medical supplies, and equipment to affected areas, provide secure storage and transportation of biological agents, and coordinate the distribution of vaccines and therapeutics. The best response combines key capacities from military, private sector, and humanitarian logistics systems, which represents a truly synergistic, evolving partnership.

Conclusion

SEA countries are particularly vulnerable to natural and man-made outbreaks of infectious diseases due to their geographic location, population density, rapid urbanization, and lack of resources. A national biodefense strategy would ensure that countries in the region are better prepared to detect and respond to emerging and reemerging infectious diseases and protect against the threat of bioterrorism. Such a strategy should include robust surveillance systems for early detection, comprehensive response planning including risk assessment, medical countermeasures, and public health response. Laboratory capacity for biosafety and biosecurity requires broad-scale improvements and must support research and development. Finally, communication and information must be facilitated via international cooperation, education and training, and investment.

Military and private sector assets such as laboratory facilities, intelligence capabilities, medical response teams, biosecurity and biosafety training, and logistics and supply chain management can all be used to support a national center for biodefense and biosurveillance. By leveraging these capabilities, a national center for biodefense and biosurveillance can enhance the ability of governments to detect and respond to biological threats, protect public health, and maintain national security.

Implementing a national biodefense strategy would require a significant investment of resources but would ultimately contribute to the long-term health and prosperity of SEA countries. By investing in national biodefense strategies and enhancing communication and collaboration with U.S., China, South Asian countries, and others, Southeast Asia can mitigate the risk of emerging disease pathogens from neighbors and protect public health and national security. Finally, national biodefense strategies are essential for protecting global health security and limiting the impact of emerging infectious diseases on human health and economies.

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