Disease Security in Northeast Asia: Biological Weapons and Natural Plagues

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ABSTRACT

In Northeast Asia and around the world, new infectious diseases are emerging and old ones are re-emerging in deadlier guises. The increasing human cost of such diseases creates an imperative for scholars and policy makers to think beyond biological weapons (BW) when contemplating disease and security. Whether deliberately or naturally caused, infectious diseases threaten the national security of states, the personal security of individuals, and are potentially a transnational security threat to all individuals in all societies. At the conceptual level, and for the purpose of responding to these threats, it is useful to think in terms of ‘disease security’. An infectious disease, whether of state, terrorist or natural origin, becomes a security threat when its effects reach the point of imposing an intolerable burden on a society. That burden can be measured in terms of the number of people infected and killed, and by the level of disruption and instability that accompanies the disease. The purpose of this paper is to demonstrate the utility of examining disease in two dimensions, natural and deliberate, and of adopting dual use responses accordingly.

Northeast Asia was chosen as a case study because it is a centre of gravity for concerns about disease security. This is due to the region’s military history, its high proportion of suspected BW states, fears of biological terrorism, and the region’s special vulnerability to new and re-emerging infectious diseases. A number of measures have been and could be applied in Northeast Asia to enhance disease security. Against the threat of BW, military and intelligence responses include tactical response units, deterrence of BW use by threat of nuclear attack, the use of force to destroy BW assets, and the recently-devised Proliferation Security Initiative. There is also scope to address disease-based threats through the legal framework of the Biological Weapons Convention. The most promising approach to disease security is through enhanced public health capabilities. This is essentially a dual use response applicable to both BW and naturally occurring outbreaks of infectious disease. Its two main pillars are disease surveillance networks (domestic and international) and robust public health systems.
ABOUT THE AUTHOR

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ACRONYMS AND ABBREVIATIONS

AG  Australia Group
AHG  Ad Hoc Group of States Parties to the Biological Weapons Convention
AIDS  Acquired Immune Deficiency Syndrome
ASEAN  Association of Southeast Asian Nations
BSE  bovine spongiform encephalopathy
BW  biological weapons
BWC  Biological Weapons Convention
CBACI  Chemical and Biological Arms Control Institute
CBDP  Chemical and Biological Defense Program
CCHF  Congo-Crimean Haemorrhagic Fever
CCP  Chinese Communist Party
CIA  Central Intelligence Agency (US)
CSIS  Center for Strategic and International Studies
CW  chemical weapons
CWC  Chemical Weapons Convention
DIA  Defense Intelligence Agency
FDA  Food and Drug Administration (US)
GDP  gross domestic product
GHSG  Global Health Security Group
GOARN  Global Outbreak Alert and Response Network
HIV  Human Immunodeficiency Virus
IDSA  Infectious Diseases Society of America
IHR  International Health Regulations
IISS  International Institute for Strategic Studies
IPMR  Institute of Preventive Medical Research (Taiwan)
ISG  Iraq Survey Group
JAMA  Journal of the American Medical Association
KRIS  Korea Research Institute for Strategy (South Korea)
NBAR  National Bureau of Asian Research (US)
NBC  nuclear, biological and chemical
NW  nuclear weapons
OTA  Office of Technology Assessment (US)
PRC  People’s Republic of China
PSI  Proliferation Security Initiative
R&D  research and development
RFCC  Russian Federation Criminal Code
SARS  Severe Acute Respiratory Syndrome
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>tuberculosis</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>vCJD</td>
<td>variant Creutzfeldt-Jakob Disease</td>
</tr>
<tr>
<td>VERTIC</td>
<td>Verification, Research, Training and Information Centre</td>
</tr>
<tr>
<td>WHA</td>
<td>World Health Assembly</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
</tr>
<tr>
<td>WMD</td>
<td>weapons of mass destruction (generally assumed to mean nuclear, biological and chemical weapons)</td>
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DISEASE SECURITY IN NORTHEAST ASIA: BIOLOGICAL WEAPONS AND NATURAL PLAGUES

Christian Enemark

INTRODUCTION

Beyond Biological Weapons

The central argument of this paper is that scholars and policy makers should regard infectious diseases as a threat to security. On 31 May 2003 delegates to the International Institute for Strategic Studies second annual Asia Security Conference convened in Singapore. Security measures at the conference included fever-detecting thermal cameras scanning people to ensure they did not exhibit symptoms of Severe Acute Respiratory Syndrome (SARS). While terrorism and weapons proliferation were hot topics of discussion, the conference overlooked what should by then have been a glaringly obvious threat to regional security — newly emerging infectious diseases and the re-emergence of old ones in deadlier guises.

The increasing incidence of such diseases creates an imperative to move beyond biological weapons (BW) when contemplating disease and security. This paper introduces the term ‘disease security’, which is concerned with protecting human populations against illness and death caused by BW or natural outbreaks of infectious disease. Whether deliberately or naturally caused, infectious diseases threaten the national security of states, the personal security of individuals, and are potentially a transnational security threat to all individuals in all societies.

At the outset, disease security is to be distinguished from a more general notion of health security. To say that anything which jeopardises the perfect health of an individual is a security threat is too broad a notion to be analytically useful. Rather, disease security is concerned with infectious diseases alone (those caused by micro-organisms such as bacteria and viruses), and only those that pose a risk of serious illness or death. All societies tolerate a certain degree of illness such that not all infectious diseases may be considered security issues. The common cold, for example, is a viral illness whose mild effects are readily overcome. An infectious disease becomes a security threat when its effects reach the point of imposing an intolerable burden on society. That burden can be measured in terms of the number of people infected and killed, and by the level of disruption and instability that accompanies the disease.
To ‘securitise’ infectious diseases is to seek some of the overriding political interest and superior financial resources associated with more traditional military concepts of security. Labelling something a security issue lends it a sense of urgency, attracts greater public attention, and implicitly demands resources. In so doing, some commentators might complain that the humanitarian imperative of infectious diseases becomes de-emphasised. But no matter how one looks at this issue, the huge potential and actual loss of life resulting from disease is undeniable. Humanitarian motivations alone are not sufficient to address this problem. In appealing to national governments — still the principal players in the international arena — infectious diseases need to be portrayed in such a way as to stimulate concerns about national interests. Historically, governments have shown greater enthusiasm towards their own security than they have towards humanitarian causes.

Altruism seldom motivates as much as pragmatism, so disease security is about getting to the practicalities of protecting states and populations. The most important practical consideration is how to respond to disease-based threats. Accordingly, this paper emphasises the need for ‘dual use’ responses applicable both to deliberately inflicted and naturally occurring infectious diseases. Some military mechanisms envisaged for addressing BW threats, such as tactical response, deterrence and the use of force, are generally of little or no use when contemplating natural disease outbreaks. There are, however, a number of worthwhile responses available which rely on intelligence, legal and public health measures. Of these, public health responses offer the greatest potential for a truly dual use approach to disease security. Whether an infection arises from a deliberate act or a natural event, health care resources and medical professionals will be the primary defence for human populations.

There is a tendency among security analysts concerned about ‘mass destruction’ to put BW into a category of threats alongside nuclear and chemical weapons. This might make sense when contemplating the possible mass casualty consequences of all these weapons, but it inappropriately downplays the fundamental scientific differences between them. For policy purposes, BW should be regarded less as being comparable to nuclear and chemical weapons, and more as being essentially a disease threat. In this respect, it is artificial to cordon off BW from other infectious disease issues. Whether a disease outbreak was of natural or deliberate origin, the required responses in the health care arena would be largely identical. Broadly speaking, the security response nexus between public health and BW exists in three dimensions:
1. **Research** — the study of naturally occurring infectious diseases is related to research into the prevention or mitigation of deliberate biological attacks. Experts from one area can be useful in the other.

2. **Surveillance and detection** — public health procedures that monitor epidemics, spikes in pharmaceutical purchases, and visits to emergency rooms are often the same procedures needed to identify and respond to a BW attack.

3. **First response and consequence management** — whether a disease outbreak is deliberately or naturally caused, the same tasks will be required of doctors, nurses and ambulance drivers.5

In the second half of the twentieth century an intellectual infrastructure evolved with respect to nuclear weapons (NW) that provided a common framework for understanding between nuclear physicists and security analysts. No such infrastructure exists for understanding the disease security challenge.6 This is largely because security analysts and life scientists have historically never had enough interaction as would have necessitated the development of a common language. At the start of the twenty-first century, public health and security planners alike face the dual threat of BW and infectious diseases. There is now an urgent need for experts in both spheres to join forces in engaging the problem of disease security.

Most of the literature relevant to this paper tends to be either exclusively disease-oriented or security-oriented. Disease-oriented studies (mostly in scientific and medical journals) focus specifically on the sources and epidemiology of particular viral and bacterial strains. By contrast, much of the security-oriented literature found in international relations journals tends to emphasise just one aspect of the threat posed by pathogenic microorganisms — their use as weapons by states or terrorists.7 Through use of the unitary concept 'disease security', this paper sets out to blend these two major approaches. While there are sometimes difficulties reconciling the language and worldviews of the public health and security studies disciplines, their mutual concern with protecting human life provides a useful starting point.

This case study of Northeast Asia is intended to demonstrate the utility of thinking in disease security terms. It explores how BW and natural disease affect the security of states and individuals within the region. A global study would probably be too unwieldy and would not allow for the way different diseases affect different parts of the world. A study of disease security issues in a single state would have limitations because of the inherently transnational nature of infectious diseases. Instead, by adopting
a regional focus, this study intends to convey a sense of local immediacy without casting too widely or narrowly in its analysis.

At present, BW are at the forefront of the political imagination when contemplating disease and security. Weapons for deliberately disseminating disease-causing micro-organisms potentially pose direct security threats to many countries. BW are not a new threat like emerging and re-emerging infectious diseases, and they fit more easily within traditional conceptions of security. For these reasons, attempts to link disease and security via the problem of BW tend to resonate more strongly with the public and policy makers. But BW are just one part of a spectrum of risks associated with the life sciences. The spectrum encompasses natural disease outbreaks, accidents arising from otherwise benign activities such as medical research with pathogens, and the use of disease as a weapon of war or terror. For the purposes of this paper, the main risks in Northeast Asia arise at either end of the spectrum — that is, disease security threats in the region encompass deliberate and natural disease.

**Dimensions of Disease Security**

This paper is an empirical study based on the observation of disease-based threats relevant to security in Northeast Asia. However, it is worthwhile delving briefly into some of the conceptual dimensions of disease security. Infectious diseases are a phenomenon occurring within individuals, within states, and on a transnational level. How then is this multidimensional problem best approached? And how can infectious diseases be transformed conceptually from a health issue into a security issue?

The traditional security preoccupation with warfare provides a useful starting point because disease has always been relevant to military operations. For example, some wars in the past have been won by disease rather than arms. Maintaining the health of combatants deployed overseas has motivated research into the control of tropical diseases. Troop movements have spread contagious diseases. And the practice of biological warfare is almost as old as warfare itself. From bubonic plague in ancient times to the present-day challenges of SARS, disease has been a constant factor in war throughout military history. The Roman historian Livy described an outbreak of plague in the Carthaginian and Roman armies during the siege of Syracuse in 212BC. The Carthaginians, less accustomed than the Romans to the city's moist climate, suffered greater casualties from the disease and were defeated shortly afterwards. In April 2003, Canada's health minister suggested that medical staff from the Canadian Forces could
help relieve pressure on staff in Toronto hospitals treating patients with SARS. The military replied that it was already critically short of physicians to look after its troops. At the time, Canada was preparing for a major deployment to Afghanistan. Had the SARS outbreak become so bad in Toronto as to require medical personnel from Canadian military units to assist, those units would not have been able to deploy overseas.11

Beyond purely military considerations, infectious diseases have broader security implications. Much of the scholarly exploration of the link between health and security takes place within the 'human security' school of thought. Human security focuses on the individual, rather than the state, as the primary object of security. An individual's personal security is derived not just from citizenship of a state, to be protected as a political unit from without, but also from adequate access to quality of life within that state. Within the human security school, disease is highlighted as a threat to human survival, livelihood and dignity.12 Globally, infectious diseases are the second leading cause of death and the primary cause of premature death.13 Each year, 275 million people contract malaria and 1.5 million die from it — this amounts to 3,000 deaths, most of them children, per day. Tuberculosis (TB) infects eight million people each year, killing 1.5 million. The disease kills even more people who are infected with the Human Immunodeficiency Virus (HIV).14 The disease directly caused by this virus, Acquired Immune Deficiency Syndrome (AIDS), is expected to have killed over 80 million people by 2011.15 It is the enormous human cost of infectious diseases which forms the primary basis for concern within the intellectual realm of human security.

Apart from impairing the health and endangering the lives of individuals, the spread of disease can cause economic damage, weaken public confidence in government, undermine social order, and contribute to regional instability. For these reasons, it is useful also to perceive the state as a referent object of disease security. A sudden outbreak of disease, especially a highly contagious one, is a health crisis with the potential to destabilise an entire society. At such times, a demonstrable capacity for effective remedial action is essential to calm public fears.16 During the 2003 SARS outbreak17 in China, there were riots in some localities caused by rumours of government plans to establish patient isolation wards. This demonstrates the panic caused when populations imagine a disease out of control, and where governments are seemingly unable to secure the safety of their citizens.18

Disease-based threats to national security can arise both inside and outside national borders. Infectious diseases do not recognise such borders and have always had a transnational influence. In January 2000 the US
Central Intelligence Agency (CIA) released a National Intelligence Assessment which predicted that new and re-emerging infectious diseases would pose a rising global health threat and complicate US and global security over the next 20 years. Such diseases would endanger US citizens at home and abroad, threaten US forces deployed overseas, and exacerbate social and political instability in countries and regions of strategic importance to the US. Increasingly, for countries outside the developing world (where infectious diseases are commonplace), it makes little sense to wait for a new disease to arrive. The recent, unprecedented appearance of monkeypox and West Nile virus inside the US suggests strongly that developed countries have a national security interest in hunting down exotic diseases before they spread from their place of origin.

For human security analysts, infectious disease epidemics are a security problem par excellence, because they threaten the lives of large numbers of people. National security analysts instead measure the extent to which these epidemics threaten the territorial integrity and political independence of the state. However, disease security does not fit neatly into either school of thought. This is illustrated in a list offered by Brower and Chalk of ways in which disease threatens security. The list contains elements in which both the individual and the state can be the object of security:

1. Disease kills — 1,500 people die from infectious disease every hour. It far surpasses war as a threat to human life.

2. Disease undermines the state — when large-scale outbreaks occur, the state’s general custodian function can be seriously eroded, especially when the ranks of first responders and medical personnel are diminished, and by a lack of popular confidence in the public health system.

3. Disease is an economic burden — in sub-Saharan Africa, 25 million people are currently HIV positive, costing already impoverished governments billions of dollars in the direct economic costs of health care as well as in lost productivity.

4. Disease undermines normal social functioning — when an outbreak of Ebola hit the Ugandan district of Gulu in late 2000, people withdrew from contact with the outside world and engaged in minimal social interaction.

5. Disease can cause regional instability — by undermining defence force capabilities, exacerbating mass cross-border population movements, and fostering economic problems, the spread of disease can add to tensions within and between states.
6. Disease has a strategic dimension — a successful, large-scale BW attack would result in a massive, simultaneous outbreak of disease causing widespread casualties and panic, and possibly overwhelming a state's public health response capabilities.21

In contemplating the security implications of infectious diseases, neither a human-centric nor state-centric approach is compelling. This paper does not attempt to provide a definitive theoretical construct for understanding why disease is a security threat, although such an endeavour would indeed be worthwhile. Suffice to say disease security is concerned both with the health of individuals and the survival of states. For now, the objective of this paper is to present an empirical account of how disease impacts on security in the Northeast Asian region.

Northeast Asia

Infectious diseases might originate within sovereign borders but their effects can reach far beyond. Given the transnational nature of disease-based threats to security, the study of individual states is of limited utility. Conversely, analyses on a global scale are often unwieldy and lack a sense of immediacy. Despite the linking effects of globalisation, geography and physical proximity still have meaning for security purposes. Accordingly, this paper adopts a regional focus. The Northeast Asian region is a centre of gravity for concerns about disease security due to its military history, its high proportion of suspected BW states, fears of biological terrorism, and the region's special vulnerability to new and re-emerging infectious diseases. For the purposes of this paper, Northeast Asia encompasses China, Japan, North Korea, Russia, South Korea and Taiwan. A caveat is that, in researching this paper, it was sometimes difficult to obtain data and statistics for North Korea and Taiwan. This is attributable to the status of each as a closed society and a non-state entity respectively.

The paper is divided into three parts. Part I explores issues relating to BW. Last century, Northeast Asia stood out from other parts of the world as an arena for biological warfare. The Imperial Japanese Army conducted BW experiments and military operations in China before and during the Second World War, and there are unresolved allegations that the US used BW against North Korea and China during the Korean War. Today, there are numerous incentives and disincentives for countries to acquire BW. These relate largely to calculations of their military value, measured in terms of the battlefield utility of BW and their strategic deterrent effect. Compared to other parts of the world, the Northeast Asian region has a high proportion of countries suspected (by the US) of possessing BW. The basis for these
suspicions, however, is rarely solid. After the 2003 invasion of Iraq, for example, evidence of BW in that country did not match up with US suspicions before the war. And BW programs that are ostensibly defensive in nature can readily be misconstrued as offensive. Beyond concerns about state-run BW programs, another threat facing the region is biological terrorism. Part I concludes with an assessment of the terrorist motivations and capabilities required to succeed in a mass-casualty BW attack. This includes a case study of the BW program run by the Japanese cult Aum Shinrikyo — the largest ever by a non-state entity.

Part II examines the disease-based threats to security that extend beyond BW — natural outbreaks of infectious diseases. Northeast Asia is particularly prone to such outbreaks, largely due to environmental circumstances and inadequate public health resources. New infectious diseases, derived mostly from animal sources, are increasingly taking hold of humans. And human activities, such as the overuse of antibiotics, are causing the re-emergence of more familiar diseases in new and deadlier forms. Different diseases have different security implications, largely depending on the extent to which they are easily transmitted from human to human. This point is illustrated in case studies of the security threats posed by two recently-emerged diseases — AIDS and SARS.

Part III critically assesses the measures that have been and could be applied in Northeast Asia to enhance disease security. Against the threat of BW, military and intelligence responses include tactical response units, deterrence of BW use by threat of nuclear attack, the use of force to destroy BW assets, and the recently-devised Proliferation Security Initiative (PSI). The 1972 Biological Weapons Convention (BWC), although not a verifiable disarmament treaty, also offers scope to address BW and other disease security issues in the region. In the context of Northeast Asia, important BWC issues are the security calculations involved in achieving disarmament on a regional level, and national legislation for implementing the Convention. Of great significance to dealing with both deliberate and natural disease is the vexed issue of BW non-proliferation in the interests of security versus the transfer of biotechnology for development purposes.

This paper argues that the most promising approach to disease security is through enhanced public health capabilities. This is essentially a dual use response applicable to both BW and naturally occurring outbreaks of infectious diseases. The two main pillars of security through public health are disease surveillance networks (domestic and international) and robust public health systems. To illustrate the importance of pursuing disease security in this way, Part III concludes with a case study of China. This
examines Chinese policy on BW, China's special vulnerability to infectious diseases, and the shortcomings of its health care system.
A high-profile aspect of disease security in Northeast Asia is the perceived problem of BW. The region bears the historical legacy of two military conflicts in which BW were actually and possibly used – the Second World War and the Korean War respectively. Today, although NW issues tend to dominate analyses of weapons of mass destruction (WMD) threats to regional security, a high proportion of states in Northeast Asia is suspected of maintaining a BW capability as well. Part I includes a discussion of the motivations and disincentives that temper a state’s attitude to acquiring such a capability. It then surveys those countries in the region suspected of possessing BW (North Korea, Russia, China and Taiwan) and those that are not (South Korea and Japan). Determining BW status, however, is not straightforward. The 2003 Iraq War showed the difficulties in proving the existence of Iraqi WMD both before and after the US-led invasion. And there is potential for defensive BW programs, such as that run by the US, to be mistaken as having an offensive purpose. Beyond concerns about state-based BW programs, Northeast Asia is also potentially vulnerable to biological terrorism – during the early 1990s, the largest-ever BW venture by a non-state entity was taking place inside Japan. Part I concludes with a discussion of the motivations required to attempt, and the capabilities required to succeed in, a mass-casualty biological terror attack. The case of Aum Shinrikyo provides a good example of the challenges that face a terrorist organisation that decides to use BW.

1. History of Biological Warfare in Northeast Asia, 1932 – 1953

Last century, no region of the world was more blighted by germ warfare than Northeast Asia. The Imperial Japanese Army’s BW program, deployed against the Chinese before and during the Second World War, was the largest ever example of the systematic use of, and experimentation with, biological agents for military purposes. After the US was victorious in the war, it closed a deal with Japanese ex-army scientists to acquire BW data. The US itself was soon afterwards accused by China and North Korea of using BW during the Korean War. For the past 50 years, this allegation has been extremely difficult to resolve. This unsatisfactory and emotionally-charged situation is attributable to the absence of publicly-available official papers that would confirm the deployment of BW by the US. It is also a consequence of the great difficulty, especially in wartime, of distinguishing between naturally and deliberately caused outbreaks of infectious disease.
A. Manchurian Unit 731

Imperial Japan ran a BW program from 1932 to 1945, during its occupation of northeast China (Manchuria) and subsequently throughout the Second World War. It weaponised the agents that cause such diseases as anthrax, plague, glanders, typhoid, cholera, and dysentery. Additionally, Japan conducted research into gas gangrene, influenza, tetanus, TB, tularaemia, salmonella, typhus, and tetrodotoxin. The development of Japan's BW program was led by Lieutenant General Shiro Ishii, head of the Kwantung Army’s Unit 731. From the time of the Japanese occupation of parts of China through to the end of the Second World War, Unit 731 experimented on Chinese civilians and Allied prisoners of war with various biological agents, including plague, cholera, and haemorrhagic fever.

Unit 731 consisted of a laboratory complex of 150 buildings and five satellite camps. The main BW research compound was at Ping Fan, just south of the Manchurian city of Harbin. It covered an area of six square kilometres and employed 3,000 Japanese doctors, technicians and soldiers. Ishii regarded Manchuria as the ideal place for his BW research because his work could be camouflaged by the poor sanitary conditions of the area, where the spread of deadly infectious diseases was quite common. For example, Manchuria had previously been afflicted by cholera in 1919 and by pneumonic plague in 1910-11, 1920-21 and 1927.

Plague held a particular fascination for Ishii. As the disease had been endemic to China since 1894, the results of deliberate attacks with the disease could, if carried out covertly, be mistaken for natural outbreaks. The question then remained how to deliver the plague bacteria effectively. When the Japanese tried dropping bombs filled with plague from aircraft, the explosion killed the bacteria. After experimentation, they found that a more effective delivery method was to cover a target area with plague-infected fleas. Ishii, who was greatly enthusiastic about this method, himself developed an explosive porcelain bomb as a delivery system. These bombs carried grain to attract rats which were bitten by the infected fleas, thereby transmitting plague bacteria to human populations via animal vectors. It had been Ishii’s idea that a fragile porcelain bomb would be easier to detonate, require less explosive, cause less heat, and thus be much safer for the infected fleas inside. A 25 kilogram bomb, called the Uji, was filled with fleas and sand. Filled with oxygen so the fleas would withstand high altitudes, the Uji could be dropped from beyond the reach of enemy anti-aircraft fire. Like an eggshell, the porcelain bomb would shatter into millions of tiny fragments, leaving no trace.
While plague remained Ishii's agent of choice, Unit 731 also conducted research into the use of anthrax. The *Ha* bomb was designed to spread *B. anthracis* spores. It featured a thin steel wall and contained 1,500 cylindrical shot immersed in half a litre of anthrax mixture. The bomb's anti-personnel shrapnel effect on impact would create anthrax-infected wounds over a diameter of around 40 metres. Whereas the *Uji* was designed for use against civilians, the *Ha* was designed for battlefield use against troops.30

The Japanese Army authorised the first wartime BW attack when Japan was fighting the Soviet Union in a border war over Manchuria. On 12 July 1939, Ishii sent a special team into enemy territory to dump prepared salmonella and typhoid bacteria into the Halha River. The effectiveness of this operation was never determined.31 A similar exercise, however, backfired badly when a release of cholera bacteria into a river resulted in the infection of Japanese troops, causing 10,000 casualties and 1700 deaths.32 On the whole, most Japanese biological attacks were unsuccessful. Nevertheless, by the end of the Second World War Japanese germ warfare in more than 20 Chinese cities and provinces had killed between 20,000 and 500,000 people.33

After its surrender in 1945, Japan levelled the BW experimentation areas, tried to destroy all documents concerning Unit 731, and swore participating scientists and officers to secrecy about its activities.34 In 1947 the US government secretly granted immunity from war crimes prosecution to Ishii and other participants in the Japanese BW program. This was in exchange for exclusive acquisition of the program's scientific data, especially the results of deadly experiments on human subjects.35 Senior Japanese officers provided information about their work on such diseases as botulism, influenza, bubonic plague, smallpox, tetanus, tularaemia, anthrax, cholera, TB and typhus.36 While the Soviet Union also used captured Japanese documents to improve its own BW program,37 it did prosecute Unit 731 personnel for war crimes. By contrast, in US-occupied post-war Japan, many former Unit 731 doctors and scientists went on to hold prominent positions at Japanese pharmaceutical and chemical companies.38

The secret deal for the US to acquire the BW technology employed by Japan during its occupation of China was exposed in 1980 by American journalist John Powell, who had obtained memoranda exchanged between US General Douglas Macarthur and his staff.39 Two years later, Japan officially acknowledged its wartime BW program and the fact that Ishii had received a large retirement pension.40 To this day, however, Japanese archives concerning Unit 731 remain closed to independent researchers.41
The significance of the US decision to acquire Japanese BW data is uncertain. One view is that information from Japanese experiments obtained after 1945 would have done little to enhance American knowledge of BW. The US had established its own BW program in 1943 which, within a year, had exceeded the expertise of Unit 731. Perhaps granting immunity to Unit 731 personnel was simply a means of keeping their knowledge from the Soviet Union. On the other hand, the Japanese data could have been extremely valuable, particularly as it would have been the first ever to describe the results of BW experiments on human subjects. Ken Alibek, a defector from the former Soviet Union’s BW program, claims that information on the Japanese BW program ‘convinced Washington that biological weapons could be developed in greater quantities and with far greater effectiveness than anyone had suspected.’

Whatever Washington’s motivations were at the time for acquiring Japanese knowledge of BW, this decision would come back to haunt the US when it was accused a few years later of deploying BW during the Korean War. In the minds of many, the credibility of these subsequent allegations was enhanced by arguments that some US methods of germ warfare appeared to have been further developments of those used by the Japanese against China.

B. The Korean War

One of the most notorious allegations of the Cold War era, still unresolved 50 years later, is that the US deployed BW on an experimental basis in China and North Korea during the Korean War. In February 1952, North Korean foreign minister Bak Hun Yung and Chinese Premier Zhou Enlai attracted worldwide attention when they accused the US of using BW in Korea. The accusation was dismissed as hostile propaganda by Western governments at the time, having been largely based on forced ‘confessions’ from captured American pilots.

In their book The United States and Biological Warfare, authors Stephen Endicott and Edward Hagerman draw on declassified American, Canadian, British and Chinese documents to argue that the US employed an operational BW system in the Korean War. The authors place this documentary evidence alongside information drawn from the medical and operational archives of the Chinese and North Korean armies in the field and observe a pattern of disease and delivery systems consistent with American BW capabilities, but anomalous with local incidence of naturally-occurring disease. The evidence cited is corroborative and circumstantial rather than direct, and the authors’ arguments feature a certain amount of conjecture. For example,
in asking why the Chinese and North Koreans did not use the archival material to reinforce their accusation in 1952, the authors speculate that the two countries did not wish to expose intelligence information that the US might have used to assess the effectiveness of their BW experiments.\textsuperscript{45} The reasoning behind such speculation is somewhat circular in the way it assumes the very point at issue: that BW experiments were in fact going on.

There is a counterargument that, as the Korean War was intended as a limited war, the US would never have risked escalating the conflict into a wider conflict by using unconventional weapons. Against this, Endicott and Hagerman point out the belief of the US military that a great advantage of biological warfare would be the enemy’s difficulty in distinguishing it from naturally occurring diseases, especially given the poor sanitary conditions of the enemy’s territory.\textsuperscript{46} This very fact, however, could be used to support an argument that deliberate disease never occurred in China and North Korea. Rather, outbreaks of diseases endemic to the area were probably natural occurrences resulting from the disruption of war, crowding, an increase in the mobility of the population, a breakdown of sanitation, and a lack of pest control and adequate medical services.\textsuperscript{47} Endicott and Hagerman describe five single, isolated cases of inhalation anthrax, without occupational exposure, occurring in China during the war.\textsuperscript{48} Today, the absence of occupational exposure in even a single case of inhalation anthrax would cause alarm regarding possible BW use.\textsuperscript{49} However, cases of non-occupational inhalation anthrax can occur. And if spores really were deliberately spread by the US, it is hard to believe that such an exercise would leave only one person dead at one site.\textsuperscript{50}

Based on US documents, some of the circumstantial evidence to suggest America used BW during the Korean War is that: (1) the US Army’s Special Operations Division at Fort Detrick at the time produced germ agents and delivery systems; (2) the US Air Force headquarters had a special division that, among other things, directed and supervised covert BW operations; and (3) that it had a specially-trained air wing sent to the Far East to carry out its tasks.\textsuperscript{51} From the enemy’s side, Endicott and Hagerman cite evidence from Chinese archives that: (1) the US produced disease-bearing insects, and disease-bearing insects were discovered in Northeast Asia; (2) that the US prepared infected bird feathers, and feathers appeared in China near exploded bombs; and (3) that there was an overlap in the diseases cultivated by the US and those diagnosed in China and North Korea.\textsuperscript{52}

Putting this evidence together, the authors contend that the US program of BW experiments was ‘too large and too complex an operation, and was possessed of too much inner logic, to have been concocted by the Communist
side for propaganda purposes, as some have suggested.'53 Yes, the Chinese did obtain confessions from 25 captured US pilots saying that they had participated in BW experiments. But interspersed with the enormous technical detail about BW delivery methods was a good deal of Communist rhetoric. This led most observers to doubt that the confessions had been written by those supposedly testifying to them. All the confessions were renounced when the pilots returned to the US after the war.54

The allegation that the US deployed BW during the Korean War may well have been an exercise in propaganda of huge and elaborate proportions. In January 1998 a reporter for the Japanese newspaper Sankei Shim bun published the findings of 12 documents from former Soviet archives that provide detailed evidence that the allegations were contrived.55 Unfortunately, the documents had to be copied by hand in the Russian Presidential Archive then translated. As a result, without the tell-tale signs of authenticity that photocopies provide — such as seals, stamps or signatures — the accuracy of the documents will inevitably be questioned until the originals are formally released. In any event, the documents describe remarkable measures taken by the North Koreans and Chinese, with Soviet advice, to create false evidence to corroborate their charges against the US. Moreover, publicly available documents from the Russian Foreign Ministry Archive indicate that Soviet officials were involved in managing the North Korean propaganda campaign about US use of BW so as to prevent the falsity of the claims from being revealed.56

The work of Endicott and Hagerman, while presenting evidence highly suggestive of BW use, is ultimately unsatisfying on the vital question of whether the US in fact used BW in the Korean War. The US had the means and the opportunity to deploy BW, but only the release of engagement reports (if they exist at all) might finally settle this issue. Similarly, more documentation regarding the veracity of the original allegations against the US, particularly from China, is needed to give a full account of whether and to what extent this was a massive propaganda campaign.57

The history of biological warfare in Northeast Asia forms part of the backdrop of BW politics in the region today. The next section looks at what factors might lead a country to acquire or reject a BW capability.

2. To BW or Not to BW? The Pros and Cons of a Germ Capability

‘Capability' is a very vague concept when it comes to BW. Most countries could produce BW agents if they wanted to, with more than 100 possessing the necessary facilities. Any country with a basic fermentation industry capable of producing beer, biopesticides, vaccines or antibiotics has sufficient
means to make crude preparations of basic BW agents like anthrax or botulinum toxin. However, it seems only a small minority of countries possessing the technological capability to pursue a BW program have actually done so. Identifying exactly which countries these are, and assessing their BW capability, is not an easy task because all BW programs, banned under international law, are necessarily kept secret. Consequently, a lot of BW threat assessment is about making judgments on the basis of imperfect intelligence. Later sections of this paper discuss which countries in Northeast Asia are suspected of having BW and the problems associated with BW-related intelligence.

There is a view that BW are vile instruments of terror that civilised nations simply do not use. This view, however, ignores the fact that some nations owning NW have also developed BW, not content with the potential destructiveness (and political prestige) of a nuclear capability. It also disregards the apparent tendency of more countries to invest in BW programs than in the past, despite the perception that the world finds these weapons immoral. Issues of stigma aside, multiple incentives and disincentives, acting in combination, have the net effect of motivating countries to possess an offensive BW program or to refrain from doing so. For example, a clear incentive for acquiring a basic BW capability is that it is much more affordable than a nuclear program. And if properly produced and delivered, BW agents have the potential to cause far more casualties on a weight-for-weight basis than chemical weapons (CW) agents. On the other hand, large-scale BW production, if not managed securely, could threaten a state's own population. In 1979, anthrax spores were accidentally released from a Soviet BW facility leading to a major disease outbreak in the city of Sverdlovsk. There are also internal security problems associated with a BW capability. For example, autocratic leaders who do not trust their own armed forces may be reluctant to delegate control of BW to subordinates for fear the weapons may be used to support a revolt.

The following sections explore the pros and cons of running a BW program by examining the two main roles of BW in the military sphere — as tactical weapons in battle and as a strategic deterrent.

A. Battlefield Utility

Under what circumstances would BW be used today? Answering this question necessarily calls for a degree of speculation as there has not been an example of large-scale BW use in modern warfare since the Second World War. In theory at least, there are certain identifiable advantages and disadvantages to using BW in a battlefield situation. One advantage is that,
provided the enemy lacks effective detection and protection gear, BW can have a devastating psychological impact, undermining the morale of troops. Even forcing the enemy into protective equipment has advantages because this is a cumbersome measure which degrades military performance and slows down combat operations. BW are also highly suitable for covert attacks — symptoms may only appear hours or days after exposure, and agents can be selected to simulate natural outbreaks of diseases endemic to the target area.\textsuperscript{62} Disadvantages undermining the military utility of BW include: the potential instability of agents after dissemination; their vulnerability to weather conditions; the potential unpredictability of the effects of a BW attack; and the lengthy incubation period between a target’s exposure to BW agents and the onset of disease.\textsuperscript{63} BW are also incapable of destroying military hardware or infrastructure.

On the balance of advantages and disadvantages, only two possible uses of BW continue to receive serious attention from military analysts: (1) BW might be used to attack the rear areas of a battlefield; and (2) BW might serve as weapons of last resort.\textsuperscript{64} On the first possibility, attacking the rear areas of an enemy’s part of the battlefield (for example, the ports through which troops are brought into an area) could seriously undermine the opposing state’s ability to mobilise and support its troops in the field.\textsuperscript{65} On the second possibility, however, the two most recent conflicts in which BW were cited as possible weapons of last resort (the 1991 Gulf War and the 2003 Iraq War) show that the precedent has been non-use.

An explanation for non-use in the 2003 war, for example, may be that Iraq was not able, for whatever reason, to deploy BW at the crucial time. However, there are at least two other possible explanations: (1) Iraq did not in fact possess BW before and during the war; or (2) it was never part of Iraqi battle plans to use BW — rather, such weapons (if an adversary could be convinced they existed) were intended purely as a strategic deterrent. So, in the context of the Iraq War battlefield, BW were either unable to be used, non-existent, or never intended to be used. Such a situation naturally yields little empirical information regarding the battlefield utility of BW.

In any event, a single battlefield is not necessarily where a broader conflict will be won or lost. As such, battlefield utility may not be the ultimate test of the military value of BW. Arguably, such weapons do not have to be lethal against large numbers of troops to be effective. They may instead play an important military role simply by creating a morale-reducing distraction in the enemy’s home cities, or by imposing a great psychological toll on troops through the primal human fear of disease.\textsuperscript{69} It is in this realm of fear that the use of BW for deterrence purposes comes to the fore.
B. Strategic Deterrence

With BW having had little demonstrated effectiveness for tactical purposes, most countries seeking or possessing a BW capability see it as a strategic deterrent and do not intend to use it on the battlefield. Contrasted with the destructive power demonstrated by nuclear tests, there is far greater uncertainty about the effects of a BW attack than is the case with NW. Even so, some countries threatened by NW-armed adversaries may feel BW provides rough strategic parity because of the theoretical potential for high casualties from a successfully executed BW attack.67 A 1993 report by the US Office of Technology Assessment (OTA) describes, for example, how a single aircraft dispersing 100 kilograms of aerosolised anthrax spores on a clear night over Washington D.C. could kill up to three million people, 300 times as many fatalities as if the aircraft had delivered a tenfold amount of the CW agent sarin.68

Martin claims that even the small probability of successful retaliation using BW can deter an attack.69 If so, she argues, the spread of this attractive BW option among poorer countries may lead to a ‘biological revolution’, comparable to the NW revolution that occurred among the major nuclear powers, providing even weak states with the ability to deter threats to their vital interests. In particular, the use of BW as a strategic deterrent may limit the ability of the US and others to take advantage of emerging high-tech conventional weaponry.70 This scenario shows BW forming part of an asymmetric strategy of focusing on the vulnerabilities of enemies who are vastly superior in terms of conventional military power.71 However, Martin probably overstates the utility of BW as a strategic deterrent. Unless and until BW have the same demonstrable destructive power as NW, it is inappropriate to regard them as having a comparable deterrent value.72 A BW-based deterrent is problematic as regards the challenge of effective agent delivery, and because of the great secrecy and uncertainty surrounding BW programs.

Considerations of the strategic reach of BW often involve analogies to NW, particularly on the issue of long-range delivery using ballistic missiles or aircraft. These mechanisms appear to offer the possibility of launching strategic BW attacks against enemy cities. With ballistic missile delivery, however, the great technical challenge is to preserve the stability and virulence of biological agents during the stress of space flight and the heat encountered when a warhead re-enters the atmosphere.73 Yet it is surprising how often analysts seem to gloss over this problem. Cordesman, in his analyses of Chinese and North Korean WMD, places great emphasis on missile technology as the primary ‘NBC’ (nuclear biological and chemical)
delivery mechanism.\textsuperscript{74} He does not discuss, however, the crucial threshold question of whether China and North Korea have succeeded in marrying missile technology with the requirements for successful dispersal of BW agents (for example, the need for favourable weather conditions and maintaining agent stability). Even if ballistic missiles did not cause BW agents to burn up on re-entering the atmosphere, they would still be vulnerable to interception and destruction with a missile defence system. Similarly, slow-flying BW-armed aircraft or unmanned drones could be shot down. As such, covert delivery by unconventional means seems to provide greater flexibility and confidence in the effective dispersal of agents on target. Analogies which suppose delivery of BW would be akin to NW delivery are of dubious value.

Another important factor in BW deterrence is that, as these weapons are banned under international law, countries in possession of them do not publicly proclaim their existence. Such countries must necessarily rely, paradoxically, on an undeclared deterrent capability. This is the opposite to how deterrence normally works in the realm of NW. In stark contrast to the secrecy surrounding BW, nuclear status is institutionalised (the five permanent members of the United Nations Security Council), nuclear tests are conducted openly in the hope of gaining political leverage (India and Pakistan), and nuclear ambitions are flaunted for strategic bargaining purposes (North Korea).\textsuperscript{75} Compared to the relatively brazen world of NW deterrence, deterring adversaries based on a BW capability involves far greater uncertainty. In essence, the capability of BW to deter derives from the uncertainty surrounding their existence and the strategic effectiveness of deliberate disease. And, inasmuch as deterrence is bound up in notions of fear, BW may exert disproportionate influence by triggering the human fear of disease — a primal fear that is not inspired by any other type of weapon.

Uncertainties regarding the usefulness of BW in battle and for strategic deterrence are relevant to whether a state would acquire BW. The next section examines in detail those states in Northeast Asia that are suspected of having done so.

3. Who Has BW Today?

Aside from the Middle East, Northeast Asia is the region with the largest cluster of countries suspected of having ongoing BW programs — North Korea, Russia, China and Taiwan.

To ‘possess’ BW means more than simply having the means of producing biological agents. According to a 1993 report by the OTA, this is only the
first step towards acquiring a militarily significant offensive BW capability. A fully-fledged and effective BW program might also feature, for example:

- tried and tested delivery systems, such as cluster munitions for dispersing bacteria;
- aircraft or missiles adapted to the delivery system;
- an established network of logistical support;
- stocks of appropriate vaccines for individual and collective defence;
- strategic and tactical BW battle plans; and
- a program for training troops to use BW and operate safely, using protective equipment, in a BW environment.\(^\text{76}\)

Establishing the existence of each of these elements would be extremely difficult for any intelligence agency. Even if an agency did have information on the full extent of a country's BW status, it would be unlikely to make that information public for fear of revealing the extent of its intelligence reach. Consequently, the following survey of BW suspects in Northeast Asia must be preceded by two important caveats. Firstly, compared to conventional, nuclear and missile capabilities, there is almost no information publicly available on state-based BW programs. This is unsurprising as BW are banned under international law. Secondly, information in the English language tends to be dominated by US intelligence assessments. As such, this survey of BW in Northeast Asia is necessarily an imperfect one, based predominantly in the realm of American suspicions.

Beyond the region, the vexed issue of finding WMD in Iraq following the 2003 US-led invasion underlines the difficulties inherent in determining a country's BW status. Moreover, even where a BW program is presented as being for defensive purposes, as in the US, there is scope for it to be construed as offensive in nature.

A. The Usual Suspects: North Korea, Russia, China and Taiwan

North Korea presents probably the greatest state-based BW threat in Northeast Asia, not least because it appears ready to play fast and loose when mass destruction is at stake. A sequence of events between October 2002 and January 2003 were characterised by high brinkmanship on the issue of NW. First, North Korea announced that it had been secretly developing highly enriched uranium for NW despite a 1994 commitment to the US that it would not do so. Next, after declaring that it would restart its nuclear facilities at Yongbyon, Pyongyang expelled inspectors from the
International Atomic Energy Agency, and then withdrew from the Nuclear Non-Proliferation Treaty. North Korea has also warned it might test or export BW, or use them in a pre-emptive strike against the US and its allies.\textsuperscript{77}

Pyongyang’s long record of terrorism, assassinations, hijacking, kidnapping, counterfeiting, drug running, bombings, agent infiltration, military brinkmanship and missile proliferation has led to the perception that North Korea is a ‘rogue state’, one likely to sell WMD to terrorist organisations or other like-minded states. The view that the cash-strapped North Korean regime is willing to sell anything to the highest bidder was reinforced in April 2003 when a North Korean freighter, the Pong Su, was caught in Australian waters smuggling large quantities of heroin.\textsuperscript{78} In January 2002, US President George W. Bush included North Korea in his ‘Axis of Evil’ alongside Iran and Iraq.\textsuperscript{79}

Labelling the Pyongyang regime in such simplistic terms has not, however, made it any easier to understand what actually goes on inside North Korea. What little information there is about North Korean BW has come from defectors. Although such sources are uncertain, North Korea’s closed system of government means there is little reliable information to be derived from other sources. While defectors have differed in their accounts of the extent of BW weaponisation, it is generally believed that North Korea has been pursuing a BW capability since the 1960s and has had an offensive arsenal of some kind since the 1970s.\textsuperscript{80}

According to US, Russian and South Korean intelligence, North Korea is conducting BW research and has possibly produced weaponised agents. It has looked into anthrax, plague, yellow fever, typhoid, cholera, TB, typhus, smallpox and botulinum toxin.\textsuperscript{81} In the late 1980s, Soviet intelligence reports identified a large BW research complex near Pyongyang.\textsuperscript{82} In December 2001 the South Korean Ministry of National Defense produced a map showing the locations of suspected BW facilities in North Korea. These included three BW production and six BW research facilities. However, very little is known about these facilities such as precisely which micro-organisms are being researched, produced and weaponised, if at all.\textsuperscript{83} North Korea has acquired dual use biotechnology equipment, supplies, and reagents that could be used to support its BW efforts and, as of the first half of 2003, the US believed North Korea possessed a munitions production infrastructure that would have allowed it to weaponise BW agents and may have such weapons ready for use.\textsuperscript{84} South Korea estimates half of North Korea’s long range missiles and 30 per cent of its artillery pieces are capable of firing BW warheads.\textsuperscript{85}
The North Korean military has given BW less attention than CW and NW, probably due to the country’s biotechnology limitations and the realisation that BW, once deployed, are almost uncontrollable. Moreover, BW are potentially a greater threat to North Korea than to its enemies because of the country’s own limited medical capabilities. North Korea is ill-equipped to deal with a BW rebound that might occur, for example, if a highly contagious agent were deliberately spread in a nearby country. Its health care resources are already under great strain without the additional burden of infectious disease, and the local production of pharmaceuticals is very limited.

In his book Shield of the Great Leader, Bermudez is conspicuously cautious in the language he uses to describe North Korea’s BW program, choosing such words as ‘capabilities’, ‘possibly’, and ‘uncertain’. This reflects the difficulties in accurately assessing a country’s BW status. It is possible, however, to venture judgments based on circumstantial evidence. For example, Bermudez observes that North Korea’s numerous An-2 COLT aircraft would be an excellent delivery system for BW due to their slow speed, ability to fly low and largely undetected, and load-carrying capabilities. North Korea also has its elite Sniper Brigades — well-trained and equipped to perform a range of special operations within South Korea and throughout the world, including covert delivery of BW. Other evidence of a clandestine BW program includes reports that testing of biological agents has been conducted on North Korea’s western coastal islands in the Yellow Sea. Although none of this information is conclusive, it is reasonable nonetheless to regard North Korea as a country of concern.

Russia bears the legacy of a Soviet BW program dating back to 1926. The Soviet Union ratified the BWC in 1975, but violated the treaty by secretly operating a massive offensive BW program until 1992. The Soviet arsenal included the causative agents of anthrax, smallpox, plague, tularaemia, glanders, Venezuelan equine encephalitis, Q fever and Marburg. The Soviets also conducted research into some exotic diseases such as Ebola, Bolivian haemorrhagic fever and Japanese encephalitis. In wartime, BW agents would have been loaded into a variety of delivery systems, including aerial bombs and ballistic missile warheads.

Russia has since renounced BW activities in its territory. In December 2000 it made the gesture of removing its predecessor’s reservations with regard to the 1925 Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous and Other Gases and of Bacteriological Methods of Warfare (the Geneva Protocol). This had the effect of a legal undertaking that Russia would not use BW at any time (including in retaliation for a BW
attack) or against any country. Today, Russia's BW activities are limited to
defence research. However, although the US government believes that the
BW agent stockpiles were destroyed following the fall of the Soviet Union,
illegal BW activities may be continuing at a few sites in Russia. In addition,
the US identifies Russia as remaining a key source of dual use biotechnology
equipment and related expertise for other countries suspected of running
BW programs.

As Russia's BW infrastructure unravels, the greatest fear is that
unemployed scientists from former BW programs will choose, or feel
compelled by penury, to offer their skills to terrorist organisations and other
states. There was great concern about such an eventuality when the Russian
State Research Centre for Applied Microbiology, which maintains stockpiles
of BW-relevant agents, filed for bankruptcy in October 2002. Some
scientists, possessing valuable information on BW research and
development, may now be working for government or even criminal
organisations. There are reports, for example, that countries such as Iran
have attempted to hire Russian specialists to help them acquire BW.

When China became a member of the BWC in 1984 it declared that,
having once been the victim of BW, it had not produced or possessed such
weapons and would never do so in the future.

US intelligence sources believe, however, that China started an offensive
BW program in the 1950s and has retained elements of that program despite
signing onto the BWC. In the 1980s, Soviet satellite images of northeast
China showed what appeared to be a large fermenting plant and a
biocontainment lab close to a nuclear testing ground. Soviet intelligence
sources also reported two epidemics of haemorrhagic fever in northeast
China in the late 1980s, an area in which the disease was previously
unknown. Soviet analysts concluded that the epidemics were caused by a
laboratory accident where Chinese scientists were weaponising viral
diseases. Intelligence reports from the Soviet era also refer to a possible BW
manufacturing facility near the nuclear testing grounds of China's north-
western Xinjiang province.

According to US intelligence, China has likely maintained an offensive
BW program to this day. China possesses a sufficiently advanced
biotechnology infrastructure as well as the requisite munitions production
capabilities necessary to develop, produce and weaponise biological agents.
An important caveat is that, while China's BW program is believed to include
dedicated research and development activities funded and supported by
the Government for this purpose, there is ultimately no open source data on
the subject of Chinese BW activities. Many legitimate Chinese research programs use similar, if not identical, equipment and facilities as would be used in a BW program.\textsuperscript{101}

While expressing concern over China acting as a supplier of nuclear, missile, chemical and conventional weapon technology and materials, the CIA in its latest unclassified report to the US Congress makes no mention of China being a supplier of BW.\textsuperscript{102} The US does, however, remain suspicious that China will itself abuse potentially BW-relevant imported materials. In October 2003, a senior US Commerce Department official called on China to allow on-site inspections to verify the end-use purpose of imports from the US that could be used to develop WMD.\textsuperscript{103} Soon afterwards, China replied by releasing a document intended to reassure the world of its commitment to WMD non-proliferation.\textsuperscript{104}

Assuming China really is investigating BW agents, one theory regarding motivation is that it believes Taiwan has developed BW of its own. If so, China may feel it needs a defensive capability as well as the means to retaliate in kind to a Taiwanese BW attack.\textsuperscript{105} Taiwan, faced with an overwhelmingly powerful adversary in China, arguably has the motivation to maintain a BW program as part of an asymmetric strategy for survival. China is continuing its build-up of weapons systems intended to increase its capabilities to coerce Taiwan. This tough stance against Taiwan is considered essential to shore up the Chinese government’s nationalist credentials, and is a symbolic lynchpin of regime security and domestic stability.\textsuperscript{106} There also exists a deep desire, embedded in China’s national psyche, to return Taiwan to the fold. US intelligence reports say China has about 400 ballistic missiles positioned along the Taiwan Strait to threaten the island should it make an overt move to independence.\textsuperscript{107}

Regarding capability, Taiwan has always maintained high standards of fermentation technology research, and its standards of biomedical research are world class. With government encouragement, many private enterprises are involved in research and development (R&D) of animal and human vaccines, biological pesticides, antibiotics, enzymes and other areas of biotechnology.\textsuperscript{108}

Against the backdrop of success in legitimate biotechnology activities, there is some evidence that Taiwan has also made efforts to acquire a BW capability. According to Russian intelligence, Taiwan is possibly conducting a BW research program, and the Canadian Security and Intelligence Service believes Taiwan has developed three dozen types of bacteria, apparently for weaponisation purposes.\textsuperscript{109}
Taiwan signed the BWC in 1972, but its role in this treaty is not officially recognised. Unable to obtain member status under the treaty, Taiwan is not bound by BWC provisions and does not have the opportunity to participate officially in confidence-building measures such as declarations of potentially BW-relevant facilities. In the course of the 2003 SARS outbreak, it was revealed that Taiwan had a secret biological warfare research centre, the military-run Institute of Preventive Medical Research (IPMR). President Chen Shui-Bian made the revelation to media in announcing that he had ordered the IPMR to work on a cure for SARS. The facility is capable of producing weapons-grade biological agents, although Taiwanese officials claim it exists only to research ways of preventing biological attacks from mainland China. Beyond producing biological agents, however, it may be difficult for Taiwan to develop a fully-operational BW program. Given the small size of this densely populated island, it is unlikely that Taiwan’s military has been able to train to use these weapons or to test their effectiveness safely.

B. Other States: South Korea and Japan

South Korea and Japan do not present any BW security concerns for the Northeast Asian region. South Korea has a well-developed pharmaceutical and biotechnology infrastructure put to peaceful uses in commerce and industry. To counter a perceived BW threat from North Korea, however, the South’s military conducts defensive biological R&D, including the development of vaccines against anthrax and smallpox. In Japan, following Aum Shinrikyo’s sarin attack in 1995 and its prior attempts to disperse BW, there is now an increased focus on BW defences. Japan’s biotechnology industry is small but growing. Japan and South Korea are members of the BWC and have been particularly active in negotiations to make the Convention work better. The two countries are also the only Northeast Asian members of the Australia Group (AG). This is an informal grouping of like-minded states that coordinate national export controls based around agreed lists of sensitive biological and chemical technologies. Issues of AG and BWC membership are discussed in greater detail in Part III.

This section has presented Northeast Asia as containing some states that are of BW concern and others that are not. However, broad observations of this kind are of limited value. Experience from other parts of the world shows that obtaining accurate information on the nature and purpose of a state’s BW-relevant activities is seldom straightforward. One year after the US invaded Iraq with the intention of disarming it of BW and other WMD, conclusive evidence of the pre-war existence of such weapons had still not come to light. Another difficulty is that, even when a state such as the US
conducts BW research for defensive purposes, there is still scope for such endeavours to be misconstrued as offensive in nature.

C. Proving BW Status: the Iraq Problem

Prior to the commencement of the Iraq War in March 2003, the US presented the United Nations (UN) with intelligence information intended to show that Iraq was running WMD programs in contravention of UN resolutions. Disarming the Iraqi regime of alleged WMD was put forward as the main goal of, and justification for, the US-led attack on Iraq. In the aftermath of the war, the failure of the US and its allies to produce conclusive evidence of Iraq's WMD reignited the fierce pre-war political debate over whether going to war was the right thing to do.

A 1200-strong team, the Iraq Survey Group (ISG), was charged with conducting the search for WMD in Iraq, under the direction of ex-UN weapons inspector David Kay. In his October 2003 Interim Report to the US Congress, Kay emphasised the enormity of his team's task when he observed that '[a]ny actual WMD weapons or material is likely to be ... difficult to near impossible to identify with normal search procedures.' To the surprise of some observers, Kay's report concluded that the combined effect of sanctions, inspections and US air attacks in 1991 and 1998 had effectively destroyed Iraq's ability to produce CW after the Gulf War. He had also found no evidence that Iraq undertook significant steps, following the expulsion of UN weapons inspectors in 1998, to build NW or produce fissile material. And so much of the ISG's attention on Iraq WMD turned to finding BW.

Finding evidence of a BW program is complicated by the so-called 'dual use' problem — that is, biological agents and equipment can also be employed for legitimate, peaceful purposes such as research and vaccine production. For example, Kay reported that Iraq had concealed new research on the BW-applicable agents Brucella and Congo Crimean Haemorrhagic Fever (CCHF). However, whether or not Iraq was remiss in not reporting its research to the UN, there are other plausible explanations for the retention of these agents, apart from their potential use as BW. No country has ever been known to have weaponised CCHF, and the World Health Organisation (WHO) reports that the virus is endemic in many countries in Africa, Europe and Asia, including Iraq. This means Iraq could have had legitimate public health reasons to be working on CCHF. Similarly, the livestock disease Brucella is endemic in Iraq. Although US military scientists weaponised this agent during the Cold War, they did not consider it effective because it is slow acting and can be treated with antibiotics. 
Unlike nuclear warheads or chemical-filled munitions, it is in the nature of BW that stockpiles of such weapons are highly unlikely to be found in ready-to-use form. Rather, BW typically constitute a just-in-time capability, the assembly of which takes place at short notice. That is what Kay envisages was the nature of Iraq’s BW program after 1996. The ISG found hidden in the home of an Iraqi scientist a vial containing a reference strain of live Clostridium botulinum Okra B bacteria. The theory is that this tiny stock of material could be a starting point from which to surge production of BW, in this case the deadly botulinum toxin.117

Against this theory, however, is an argument to suggest that the substance was never intended to be part of an active BW program. The scientist had been storing the vial in his refrigerator for 10 years since 1993, the particular strain of botulinum (Okra B) having apparently been originally produced by the American Type Culture Collection for licensed export to Iraq in the late 1980s. The bacteria were found in a collection of ‘reference strains’ of other relatively harmless biological organisms that could not be used to produce BW. Reference strains are retained to assist in identifying unidentified agents. Moreover, there is no evidence that Iraq or any other country has ever succeeded in using the Okra B strain for warfare purposes. The botulinum toxin derived from this strain (which commonly causes food poisoning resulting from improper canning) disperses quickly in the air, making it ineffective as an airborne agent for weapons.118 In these circumstances, there can be no certainty that the vial discovered by the ISG was part of a BW program.

Another relevant WMD intelligence issue was the discovery of two Iraqi trailers, alleged to be part of a mobile biological warfare production unit. These trailers, found by US forces in April and May 2003, have been offered as proof that Saddam Hussein was hiding a BW program. The idea is that, by making its BW production facilities mobile, Iraq could more easily circumvent the pre-war UN inspection process. The significance of the trailers has been the subject of intense debate within the intelligence community, with experts divided on technical grounds over whether the trailers could actually have produced BW.

At the end of May 2003, the CIA and the Defense Intelligence Agency (DIA) jointly issued a report on their analysis of the trailers. The report described the results of examinations as being largely consistent with US intelligence reporting before the war. Certainly, the general configuration and design of the trailers were very similar to the mobile BW plants described by US Secretary of State Colin Powell in his presentation to the UN in February 2003. The two trailers were alleged to have been designed to produce
pathogenic agents in unconcentrated, liquid slurry form. For this purpose, they were equipped with fermentation units, water supply tanks, a water chiller and gas collection devices. The report argued that the trailers were unlikely to have been used for legitimate purposes such as water purification, vaccine production or biopesticides. Rather, the size and nature of the equipment inside the trailers indicated that BW agent production was their only logical purpose.\footnote{119}

In opposition to the report’s findings, sceptical experts pointed out that the trailers lacked gear for steam sterilisation, normally a prerequisite for any kind of biological production. Not having such equipment available between production runs would, they argued, result in contamination and failed weapons. On the other hand, the trailers might have obtained steam sterilisation functions by connecting up to a separate supply truck.\footnote{120}

Another theory is that the trailers were used to chemically produce hydrogen for artillery weather balloons. The CIA/DIA report stated that this was a ‘cover story’ concocted by the Iraqis to conceal the real purpose of the trailers. Some features of one trailer — a gas collection system and the presence of a caustic substance — were consistent with both biological agent production and hydrogen production. The report argued, however, that the trailer was unnecessarily large and its equipment not suited for the efficient production of hydrogen.\footnote{121} At the time the report on the trailers was drafted, the DIA’s engineering teams had not concluded their work. In findings leaked to the New York Times, it was revealed that a majority of the DIA engineers believed hydrogen production to be the true purpose of the trailers.\footnote{122} This cast doubt on the report’s opening claim that the trailers constituted ‘the strongest evidence to date that Iraq was hiding a biological warfare program’.\footnote{123}

Significantly, the report supposed that a third trailer (not located) would need to have been involved for post-production processing, such as spray-drying the liquid slurry into a more useful powder form.\footnote{124} As this further processing would have been essential for weaponisation of BW agents, an inference to be drawn from the report is that the two trailers in themselves did not constitute conclusive evidence of a working Iraqi BW program.

Where a suspected BW program is being concealed, as allegedly was the case in Iraq, producing convincing evidence of its existence is a significant challenge. Determining BW status is difficult also because many countries maintain BW research programs that are presented as defensive in nature. When elements of such programs are kept secret, as has been the case in the US, there is potential for other countries to suspect an offensive purpose.
D. Defensive BW Programs: the Case of the United States

The BWC permits work with BW agents for peaceful purposes, which includes the development of defences. The US Department of Defense, for example, maintains a Chemical and Biological Defense Program (CBDP). The purpose of CBDP research is to provide core capabilities for defending against chemical and biological threats and to ensure the US can make appropriate technological advances in the long term. BW-relevant research by the CBDP includes advanced biological detection systems, advanced materials for improved filtration and protection systems, advanced decontaminants, advanced information technologies, and medical and biological defence research (including diagnostics, therapeutics, and vaccines for viral, bacterial, toxin and novel agents). Among its many projects, the CBDP is currently working on improved vaccines to protect against botulinum toxin, equine encephalitis, plague, and next generation anthrax.125

The benefit of such endeavours is the direct, practical effect of reducing (and possibly avoiding) the human damage that would result from a BW attack. The apparent goal of defensive BW programs is to reduce potential targets’ vulnerabilities to such an extent that potential aggressors would not see a biological attack as worthwhile.

In addition to purely defensive R&D, the US conducts threat assessment projects. These ostensibly involve experimenting with offensive BW applications so as to determine matching defensive requirements – a practice known as ‘red teaming’. Defensive BW programs, and threat assessment projects in particular, are nevertheless hugely controversial. They potentially push the line between what is permissible and what is illegal under the BWC. Here, the problem lies in perceptions of intent. Western BW programs are held up as consistent with the BWC even without transparency or clear explanations, whereas similar programs would undoubtedly be viewed by the West as violations of the Convention if administered by governments classified as ‘rogue states’126.

During the 1990s the US switched from relative openness to secrecy about its BW experiments.127 In September 2001 the New York Times revealed the existence of three classified US projects which all appeared to contravene the legal limits laid down by the BWC:

- from 1997 to 2000 Project Clear Vision involved building and testing a Soviet-model bomblet for dispersing bacteria;
- in 1999-2000 Project Bachus investigated whether a would-be terrorist could assemble an anthrax production facility using commercially available materials and equipment; and
- in early 2001 Project Jefferson involved the recreation of a vaccine-resistant strain of anthrax bacteria.\(^{128}\)

A number of authors have questioned the legality of these projects.\(^{129}\) The revelation of Project Clear Vision caused particular concern. The BWC bans delivery systems categorically, whether intended for defensive purposes or not. Data from the bacteria bomblet project was aimed at predicting agent distribution and potency as a function of dispersal method, agent type, amount of agent, and environmental conditions — such data appears to have greater offensive than defensive potential.\(^{130}\)

Rosenberg argues that the development of offensive capabilities for secret threat assessment projects endangers the norm against BW use and undermines the BWC. The outcome of such endeavours may be a covert international arms race to stay at the cutting edge of BW development, using defence as a cover.\(^{131}\) For Tucker, a reasonable level of transparency is required to avoid controversy, such as publicly describing defensive BW programs in general terms while omitting technical details. This, he argues, would help to build confidence in US compliance with the BWC without making it easier for hostile states to circumvent planned defences.\(^{132}\)

The controversy over the US defensive BW program highlights the extent to which discriminating between legitimate and illegitimate programs relies on perceptions of intent. Depending on one's point of view, research and experimentation with pathogenic agents is either a defensive endeavour or a dangerous BW project. In sum, it is no simple matter identifying which states are in breach of international law governing BW and which are not.

4. Biological Terrorism

In the realm of BW, concerns about disease security extend beyond traditional state-centric approaches. Increasingly, there is a fear that infectious diseases might be wielded deliberately by non-state, terrorist actors. There is no evidence to indicate that Northeast Asia is particularly susceptible to this kind of eventuality. At the same time, there is no reason to suppose that the threat of BW terrorism is less relevant to this region than to any other. Accordingly, what follows is a more generic discussion of cases and concepts.

In contemplating whether a terrorist would wield BW, the two key questions are: (1) what are the motivations and disincentives for mass
casualty biological terrorism?; and (2) what is required to carry out a major BW attack successfully? This section discusses the motivation and capability required to engage in BW terrorism, and includes a case study of the BW program run by the Japanese cult Aum Shinrikyo in the early 1990s — the largest ever by a non-state entity.

The history of terrorism reveals very little about the willingness and ability of terrorists to use BW — there have been very few confirmed cases of terrorist groups or individuals acquiring or employing biological agents. In any case, examinations of past terrorist acts might not provide much insight into the aims, motivations, and capabilities of contemporary terrorists. Accordingly, it is necessary to engage these issues also at the conceptual level. To the extent that empirical analysis is useful, however, this paper includes discussion of three of the best known cases of BW use by terrorists: (1) the 1984 use of salmonella by the Oregon-based Rajneesh cult in the US; (2) the October 2001 attacks in the US by an unknown Rajneesh cult using envelopes laced with anthrax powder; and (3) the BW program run by the Japanese cult Aum Shinrikyo in the early 1990s.

Faced with the uncertainty associated with a paucity of empirical data on BW terrorism, many policy makers understandably tend to err on the side of regarding the threat potential as high. Any government, whose first duty always is national security, would naturally be inclined to hedge against terrorists exploiting the full catastrophic potential of BW. In many policy discussions regarding terrorism, one can discern a pessimistic outlook formed by a belief that hypothetical scenarios of terror will become a reality. Politicians, in particular, have little to gain by publicly espousing an optimistic view towards terrorism. They tend to consider and enunciate the worst possibilities that could arise from a terrorist attack because the political consequences of being revealed as having understated the threat are severe. Moreover, the media treatment of terrorism serves to amplify the tone of pessimism because of a belief by some journalists that only bad news is newsworthy.

But assuming the worst, while analytically and politically convenient, is an expensive and possibly counterproductive way to approach the problem of BW terrorism. Resources for counterterrorism are limited and the public can become impatient with expenditure on a threat that might never materialise. In the interests of accurate threat assessment and appropriate resource allocation, it is incumbent on policy makers and scholars alike to go beyond analysing societal vulnerabilities and canvassing all the ghastly possibilities of BW terrorism. Stepping away from strict pessimism, it is important also to explore why some terrorists would not or could not carry out a mass casualty BW attack.
A. Motivations and Disincentives

For three reasons, BW have special appeal for the purposes of mass casualty terrorism. Firstly, BW are easier and cheaper to acquire than NW and, if properly produced and delivered, can cause more casualties with less material than CW. An abundance of material to this effect has been placed on the public record, to be read by potential terrorists and victims alike.\textsuperscript{135} Secondly, the effects of BW on the target population are difficult to detect and to counter. While much effort, in the US especially, is currently being directed to improving BW detection, the technology is still in its infancy. Detecting the presence of biological agents is far more difficult than detecting radioactivity or the fallout from a chemical attack. Suspicions of a BW attack would likely not be aroused until patients started presenting unusual disease symptoms at numerous clinics and hospitals in the target country. At that point, managing the effects of a BW attack could be extremely difficult. Health systems around the world are already stretched to the limit dealing with infectious diseases that are naturally occurring as well as non-infectious illnesses.

Third and most importantly, the insidious nature of BW agents is perfect for generating fear. Terror is not just the physical act — it is also something that goes on in the minds of those who fear becoming victims. The fear element of BW can be an extremely powerful weapon in itself. People exposed, or possibly exposed, are likely to suffer disorders of mood, cognition and behaviour because of the uncertainty, fear and panic that may accompany a BW incident.\textsuperscript{136} Fear is disproportionately evoked by certain characteristics of risks, including involuntary exposure, unfamiliarity and invisibility.\textsuperscript{137} A BW attack would exhibit all these characteristics. People are frightened, disgusted and infuriated that someone would deliberately contaminate them and, if the BW agent be contagious, that they in turn might contaminate others.

Humanity fears disease not only for its ability to kill but also for the horrifying way in which it kills. For example, anthrax elicits horrific symptoms such as disfiguring skin eruptions. The challenge for governments under attack with BW, or potentially under attack, is to dispel fear by delivering accurate and timely information to the population. South Korea, for example, has taken steps to minimise the chances of nation-wide panic in the event of a BW attack by establishing a program of publicity and public education.\textsuperscript{138} Misinformation about technical issues in particular can create unnecessary concern — for example, some media coverage in the US has wrongly described anthrax as a communicable disease.\textsuperscript{139}
While disease may be regarded as an ideal generator of terror, there are also reasons why many terrorists might rule out the use of BW. For those pursuing clear political aims in a given territorial area, such an attack would not generally appeal. This is because terrorists' own constituency could be put at risk, especially if a highly contagious agent were deployed. For example, a BW attack in Ireland would affect Catholics as well as Protestants, an attack in India would hit both Hindus and Muslims, and using BW in Israel would affect Arabs as well as Jews. Terrorist organisations such as the Irish Republican Army and Hamas are restrained by political vision, operational practices and moral codes from seeking and using unconventional weapons. In some cases, terrorist group leaders have indicated to their members that the use of CW or BW would not be legitimate to their struggle.\(^\text{140}\)

Other disincentives to terrorists using BW include the risk of provoking a massive government crackdown and alienating supporters. At a more practical level, BW are also inherently dangerous to use without special equipment and their effects almost impossible to control after deployment. These considerations may lead a terrorist to conclude that conventional bombs, as tried and true weapons, are more 'obedient' than BW. As such, explosives may remain the terrorist's weapon of choice for the foreseeable future.\(^\text{141}\) The next section of this paper explores in greater depth the issue of acquiring a BW capability.

Some authors suggest that terrorists construct their attacks as a form of theatre. There is a school of thought which says that if terrorists want 'a lot of people watching' a spectacular event, rather than 'a lot of people dead', they are unlikely to turn to mass casualty weapons. For terror purposes, there is an important psychological element in any attack. Most terrorists need the demonstration effect — that is, showy attacks that produce a great deal of noise.\(^\text{142}\) By contrast, a BW attack would by its very nature be silent. And, as the disease caused by a biological agent would take time to incubate inside victims' bodies and possibly spread to others, the effect of a BW attack would be delayed and gradual. This means a terrorist attack of this kind would lack a single catastrophic moment for the media to focus upon along with the political message, if any, to be conveyed. Indeed, where a contagious agent is deployed, journalists and camera crews may not even be able to access a BW-affected area because of patient quarantine restrictions.\(^\text{143}\) On the other hand, the silence and delayed effect of a BW attack may be attractive for a terrorist wishing to perpetrate the 'perfect crime' and avoid detection. And theatrical considerations would matter little to terrorists with an apocalyptic bent for whom 'a lot of people dead', by whatever means, is the true objective.
The unique and devastating effects of a successful BW attack mean the inclination to use BW to achieve particular outcomes may vary enormously from one terrorist organisation to the next. The most likely perpetrators of BW terrorism are extremist religious groups, especially those with apocalyptic visions. Such groups may display an extranormative, transcendental attitude to violence and mass death. They are unconstrained by fear of government or public backlash, since their actions are intended to please a Supreme Being and themselves, not to impress a secular constituency. And their victims, being outside their religion, may be viewed as subhuman. Terrorists contemplating using disease as a mass casualty weapon would be mindful that epidemics throughout history have killed many more people than wars. Moreover, BW might have particular appeal, over other forms of WMD, because of the prominence of disease in some religious texts. For example, in the Bible's Book of Exodus the fifth plague used by God to punish Pharaoh was murrain, a group of cattle diseases that includes anthrax. And in the Book of Revelations, 'Pestilence' accompanies the Four Horsemen of the Apocalypse. Accordingly, some terrorists might set out to use disease deliberately in order to mimic and please God.

A scan of recorded BW terrorist events suggests, however, that even a strongly religious element within a terrorist organisation does not necessarily mean it will pursue some kind of disease apocalypse. To the extent that religiously motivated terrorists also have a political goal — for example, the establishment of an Islamic state — they will encounter more earthly, political constraints. In particular, politico-religious groups (Al Qaida is a good example) would need to factor in popular reactions to their violence. This does not exclude the possibility of a mass casualty attack, although it provides such groups with a reason to refrain from such action.

The perpetrators of the 2001 anthrax attacks in the US have not yet been found, so it is difficult to discern their motivations. A religious element is apparent in one of the anthrax-laced letters which read 'Allah is great' and 'death to Israel'. However, the same letter also instructed the reader to take antibiotics. Arguably, by announcing that a BW attack was going on, the perpetrators intended that only limited damage would result. When the Rajneeshees, an Indian religious cult, contaminated restaurant salad bars with salmonella bacteria in 1984, their aim was to incapacitate voters to win a local election and seize political control of Wasco County, Oregon. Clearly, the cult was pursuing a tangible political end rather than an apocalyptic goal. In the case of the Japanese cult Aum Shinrikyo, however, such a goal was very likely behind its efforts to produce and disseminate BW in the early 1990s. This organisation's motivation to use BW is examined further in a separate section of this paper.
Moving away from tentative judgments based on scarce empirical evidence, a conceptual model formulated by Daniel Gressang offers a useful starting point for identifying terrorists interested in BW. In assessing potential terrorist use of WMD generally, Gressang adopts the fundamental tenet that all terrorists alike seek to acquire and maintain some degree of influence over an identifiable ‘audience’, broadly defined. For example, Osama bin Laden might make pronouncements about the need to liberate holy Muslim lands from infidel occupation. In so doing, his intended audience at one level might be Allah, but Al Qaeda might also be reaching out to at least three earthly audiences — the US government, the American people, and the Islamic community.

With an audience in mind, every terrorist perpetrates an attack for a reason. To observers, the reasoning of terrorists may seem unjust, nonsensical or irrational. Gressang argues, however, that terrorists’ own perspective, rather than observers’ perspectives of terrorists, is the pre-eminent consideration. Terrorists’ WMD potential is determined by a three-dimensional communicative dynamic between terrorist and audience. The three dimensions are: (1) the type of audience, human or ethereal, to which the terrorist is appealing; (2) the content of the terrorist’s message, whether it calls for destruction rather than change; and (3) the degree of social interaction the terrorist engages in. According to Gressang’s model, WMD potential is greatest where the terrorist (1) is appealing to an ethereal audience (a Supreme Being); (2) has a message of destruction (for example, of a state or race); and (3) has an inapposite, minimalist relationship with the rest of society.

Gressang’s model is very useful when contemplating the motivation of terrorists to cause mass casualties, although it lacks two important contextual elements. First, in using the cover-all term ‘WMD’, the model does not provide scope for considering why terrorists might prefer to use BW rather than nuclear or chemical weapons. In addition to the sheer number of casualties to be achieved, the type of casualties caused might also be relevant to terrorist motivations regarding WMD. As discussed above, disease-based casualties might hold a particular fascination for some religiously motivated terrorists. Second, there is arguably interplay between the motivation to use mass casualty weapons and the technical ability to do so. Gressang’s model could be improved by adding a fourth dimension — capability. This would measure the extent to which WMD production and weaponisation is hindered or enhanced by the nature (socially detached and with apocalyptic worldviews) of those terrorist groups identified as most keen to cause mass casualties.
B. The Challenge of Acquiring a BW Capability

Once a terrorist organisation has decided, for whatever reason, that BW are a way to achieve its aims, there still remains the issue of having the capability to carry out a BW attack successfully.

There is more to a terrorist's BW enterprise than simple expressions of interest. It is one thing for an organisation to let it be known that it is interested in BW — it is quite another to be able to conduct experiments with pathogenic agents and then master the procedures for carrying out a successful attack. In the case of Al Qaida, letting it be known that the organisation is interested in BW\(^\text{132}\) has probably been motivated more by a desire to instil fear and generate publicity rather than to achieve mass casualties. The relationship between terrorists and BW can range from mere interest in using such weapons, an attempt to acquire a pathogenic agent, actual possession of an agent, use of an agent for small-scale purposes such as assassination, to the use of an agent to inflict mass casualties.\(^\text{133}\) This last relationship is of greatest concern to policy makers and so attracts the focus for analysis in this paper.

In the literature on BW, there is no shortage of descriptions of terrorists possessing nightmarish capabilities. For example, in their book *Living Terrors*, Osterholm and Schwarz present BW terrorism scenarios including:

- a disgruntled laboratory worker who grows anthrax bacteria in an abandoned farmhouse then disperses it in a crop duster over a sports stadium;
- a hospital worker who steals a deadly strain of *E. Coli* bacteria and uses it to poison the food of hundreds of Catholic schoolchildren; and
- a former Soviet scientist who grows smallpox virus on fertilised eggs, spreads it through a shopping mall air conditioning system, then watches it spread through America.\(^\text{154}\)

However, a scan of the literature on biological terrorism reveals that insufficient attention has been devoted to assessing dispassionately whether hypothetical scenarios are likely to be transformed into reality. Expert opinion is divided on how easy it is to acquire a BW capability, and estimates on the cost of such a venture range from thousands of dollars to the millions. Some say that an undergraduate biology student could easily produce biological agents in a garage, tool room or kitchen, and that making BW is as easy as brewing beer. Others believe a much higher degree of expertise is required: a BW project would need a group of experts in several fields (for example, microbiology, aerosol physics, pathology and pharmacology), as well as access to a sophisticated laboratory.\(^\text{155}\)
Accounts of how easy it is to produce a biological agent often mask the real technological challenge required for a successful BW attack — weaponisation of the agent. Weaponising bacteria, viruses and other microorganisms so that they can effectively enter the human body involves highly sophisticated procedures. For example, producing ‘weapons grade’ anthrax for aerosol dissemination requires lyophilization (freeze-drying) and microencapsulation to ensure that the *B anthracis* spores are of a suitable size (1 to 5 microns) for penetrating deep into human lungs. Particles larger than this tend to drop straight to the ground rather than stay suspended in the air ready for inhalation. This technical requirement for precise particle sizes means that the frequently-imagined attack scenario of crop-spraying aircraft delivering BW is probably unrealistic. On the other hand, specially designed or modified aerosol spraying devices might be more effective at disseminating BW agents.

Contaminating food or drinking water with BW agents is not straightforward either. Dilution, chlorination and filtration work against water-borne BW, and cooking, pasteurisation and other routine food safety precautions are also generally sufficient to kill pathogenic bacteria. Nevertheless, food or water contamination could still be an effective BW delivery method in less developed countries where safety measures are not standard.

Should acquiring an effective BW program from scratch on their own prove too difficult, another possibility is that terrorists might simply be endowed with that capability by a supportive state. Haselkorn argues that there is only a slight degree of difference between providing BW to a specific terrorist organisation and a state leader pre-delegating launch authority to military commanders — both are a risk to the regime. Iraq’s 1990 pre-delegation decision, he argues, seems to indicate that Iraq would not have been averse to handing BW to terrorists if faced with an unwinnable confrontation. Other authors argue that the notion of a state sponsoring WMD terrorism is highly problematic. Bearing in mind that only the most extreme and apocalyptic terrorist groups are likely to employ BW, a state may fear loss of control or treachery by a BW-capable group. Could such a group be entirely trusted not to cause disease in the sponsor state’s own territory? The discovery of links between a BW terror incident and a state sponsor might also attract disastrous retaliation by the target country. Whether for fear of disloyalty, incompetence or indiscretion, any state anxious for its own survival would be most unlikely to place a catastrophe-scale BW capability in the hands of terrorists.
In contrast to the proposition that BW production and delivery poses great technical challenges, some analysts propose that terrorist use of BW need not be high-tech at all. Highly contagious viruses could be effectively introduced by voluntarily infected terrorists — they would travel to the target area during the incubation period of the disease. Today’s suicide bombers, it is argued, may become tomorrow’s ‘suicide sneezers’ carrying smallpox into an enemy population.\(^{162}\) However, initiating an epidemic by dispatching infected hosts to a target population might not be as straightforward as it sounds. The hosts may be too debilitated to withstand travel, and they may be recognisably ill on arrival at their destination, thus triggering the suspicions of the target country. And even if a population were susceptible to a given disease, an isolated case might not be enough to guarantee an epidemic. In any disease outbreak, many infected hosts will be epidemiological dead ends — they may fail to pass on the disease, or those they contact may fail to do so. To be effective, the deliberate causing of an epidemic may require repeated introductions of a contagious disease, and this would increase the possibility that the target country would detect the attack.\(^{163}\) It is still possible, however, that a biological attack could successfully be carried out in this way, especially if the target country were not generally vigilant regarding public health.

In assessing the likelihood of a suicide BW attack, it is worthwhile returning to questions of motivation. Dolnik defines a suicide terror attack as ‘a premeditated act of ideologically or religiously motivated violence, in which the success of the operation is contingent on self-inflicted death by the perpetrator(s) during the attack.’\(^{164}\) He argues that someone willing to be a suicide bomber would not necessarily be willing to be a suicide sneezer. The difference lies in the manner of dying. Suicide bombers are traditionally motivated by the promise of a quick and honourable death. There are reports of bombers smiling with joy prior to detonating their explosives and (they believe) entering the gates of heaven. By contrast, a terrorist operative infected with Ebola or smallpox would not likely be smiling during the days or weeks it would take to succumb to the disease. This option would seem much less heroic than a suicide bombing and would carry the unattractive risk of a prolonged and undignified death.\(^{165}\) And because the disease might not prove fatal, or medical intervention might occur, there is no guarantee of the person achieving martyrdom.

As is the case regarding motivation, the paucity of empirical information about biological terrorism makes it very difficult to make accurate judgments regarding capabilities. The record of BW terrorist acts, such as it is, yields
mixed lessons. The Rajneesh cult's 1984 attack using salmonella bacteria succeeded in causing 751 cases of diarrheal illness, but resulted in no deaths.\textsuperscript{166} The October 2001 attacks in the US using high-grade anthrax powder in envelopes raised concerns that a group or individual had either successfully crossed the weaponisation threshold or succeeded in stealing the bacteria from a national defence program. Letters mailed through the postal system produced 22 cases of cutaneous or pulmonary anthrax, and five victims died over a period of eight weeks. The quality of the samples varied, but the several grams sent to Senators Daschle and Leahy were prepared so that most of the particles were under five microns in size and treated to facilitate aerosolisation. The mechanics of postal processing machinery combined with the pore size of ordinary mailing envelope paper led to the exposure of postal workers, as well as to the cross-contamination of mail. The \textit{B anthracis} spores contained in all envelopes were known variants of the Ames strain, which first became available to the US defence establishment in the early 1980s.\textsuperscript{167}

These two examples of BW terrorism may be regarded as having been successful, although fortunately they did not result in mass fatalities. They should not, however, lead scholars and policy makers to suppose that BW attacks are a straightforward process for terrorists. When a well-resourced terrorist organisation in Japan attempted to cause a large number of deaths using BW, it consistently failed.

\textbf{C. The Case of Aum Shinrikyo — Motivated but Incapable}

During the early 1990s Aum Shinrikyo, a Japanese doomsday cult, failed in several attempts to cause mass casualties in Japan using two of the most basic BW agents — \textit{C botulinum} and \textit{B anthracis}. This was despite possessing ample finances, scientific expertise, and well-equipped laboratories. And its activities were carried out virtually undetected and undisturbed by the Japanese authorities.

Aum is best known as being responsible for the sarin attack on the Tokyo subway that killed 12 people and injured 5000 on 20 March 1995. The cult, founded in 1984 by Chizuo Matsumoto (a former yoga instructor), used front companies, high-pressure fundraising, insurance fraud and other criminal activities to become an organisation of 10,000 - 60,000 members, with assets valued at between $US300 million and $US1 billion.\textsuperscript{168} Aum was a millenarian cult seeking to hasten Armageddon by precipitating a US nuclear attack on Japan. Matsumoto (also known as Shoko Asahara) claimed to have supernatural powers and saw himself as a messiah who would lead his followers to safety as the end of the world drew near. He prophesised
the destruction of the Japanese government and the creation of a future world in which he and his followers would rule.\textsuperscript{169} Aum had a charismatic leader asserting divine authority, an apocalyptic world view, a fascination with violence, and a collective paranoia amongst its members. All these characteristics predisposed Aum towards extranormative acts of violence such as using mass casualty weapons.\textsuperscript{170}

It is remarkable that Aum’s BW program — probably the largest and costliest ever conducted by a non-state organisation — has received scant analytical attention.\textsuperscript{171} An important reason for this, however, is that the Japanese authorities have to date released very little information on the cult’s activities. What little information exists on the public record has mostly been distilled from trial proceedings involving cult members following the 1995 sarin attack. While the picture of Aum’s BW efforts is incomplete, it seems clear that the cult encountered enormous difficulties, mostly technical, in getting its germ weapons to work.

In April 1990, Aum members drove a car around the Japanese Diet in Tokyo with the exhaust pipe fitted out to disseminate what was supposed to be botulinum toxin. In early June 1993 they tried a similar exercise, this time with the goal of disrupting the wedding of Japan’s Crown Prince Naruhito. Later that month, Aum members attempted to disseminate what they believed to be anthrax bacteria from the roof of an eight-story building owned by the cult. Although police received over 200 complaints about foul-smelling white fumes coming from Aum’s building, they reportedly did not investigate.\textsuperscript{172} None of these ‘BW’ attacks had the desired effect of killing large numbers of people.

While a lack of data makes it difficult to understand exactly why Aum’s BW ventures failed, a survey of existing unclassified information leads Rosenau to suggest three main reasons why the cult did not succeed: (1) its strains of anthrax bacteria and botulinum toxin were not sufficiently lethal; (2) Aum had difficulties preparing these agents for dissemination and dispersing them; and (3) the organisational nature of the cult itself imposed limitations on Aum’s BW efforts.\textsuperscript{173}

In trial proceedings following his arrest, Seiichi Endo, Aum’s ‘Minister for Health and Welfare’, testified that the cult’s delivery methods — spraying biological agents from rooftops or from the back of a truck — had proven ineffective, and that their chosen strains of biological agents were not sufficiently virulent.\textsuperscript{174} Even had dissemination of Aum’s ‘BW’ substances been so effective as to enter human bodies, this would not have caused disease. Its ‘anthrax’ was a harmless strain of the \textit{B anthracis} bacteria, and its ‘botulinum toxin’ was probably just the carrier fluid — Aum’s scientists
having failed to isolate the toxin from the *C botulinum* bacteria in their laboratories.\textsuperscript{173}

Although Endo had valuable skills as a molecular biologist, it seems Aum lacked the full set of area skills required to succeed in a BW venture, namely pathology, engineering, meteorology, and aerosol physics. Isolating and growing a toxic bacillus is difficult for an inexperienced scientist because there are so many related bacillus species that can be mistaken for the ones that cause anthrax. After material was sprayed from an Aum building in June 1993, Japanese police took samples of a fluid leaking from a pipe on the outside. Years later, the fluid samples were analysed by scientists in the US and found to contain anthrax bacteria belonging to the Sterne strain. Sterne anthrax is designed to lack a fragment of DNA that enables the bacteria to become toxic, so it is harmless.\textsuperscript{176} For Aum’s botulinum toxin project, Endo had obtained *C botulinum* from soil in a wilderness area of Hokkaido, Japan, rather than from an established source. As a result, he would have encountered great difficulties using an enrichment process to cultivate the bacteria in large enough quantities to produce an amount of toxin sufficient to cause mass casualties.\textsuperscript{177} Although deadly, botulinum toxin is extremely difficult to purify, particularly in large quantities, and is highly unstable in pure form. It also degrades rapidly when exposed to air and sunlight.

To avoid the technical challenges of turning *B anthracis* spores into powder using large and expensive centrifuge and drying machines, Aum probably tried to disseminate its bacteria in liquid slurry form. This must be continuously refrigerated until it is used, and unless the slurry is extremely pure, material is likely to settle at the bottom of its container and so clog the sprayer used for dissemination. There is some evidence to suggest that Aum encountered problems keeping their dispersing devices from clogging. Around the time of the 1993 rooftop attacks, there were reports of a jelly-like substance scattered in the street nearby. This may have been clumps of ‘anthrax’ culture medium (perhaps a blood agar substance), which would be likely to clog a sprayer device. Even if Aum’s substance were dangerous, it could have been rendered harmless by adverse weather conditions at the time the attacks took place. Many appear to have been staged during the day, during Tokyo’s warm summer months, when strong sunlight and smog were likely to have been present. Such weather conditions would have seriously reduced agent effectiveness.\textsuperscript{178}

Rosenau suggests that cult-like terrorist organisations, the ones that seem to have the greatest interest in using BW to achieve mass casualties, may be the least suited to meet the complex requirements for a BW program.\textsuperscript{179} The Aum example illustrates that a paranoid, fantasy-prone and sometimes
violent atmosphere is not conducive to the sound scientific judgments needed to produce BW.\textsuperscript{180} Aum’s leaders reinforced the cult’s doctrines among members through the use of physical isolation, beatings, physical torture, and the administration of hallucinogenic drugs such as LSD.\textsuperscript{181} As an organisation, Aum was also fickle by nature and inclined to embark on numerous expensive, and sometimes bizarre, ventures rather than concentrate on perfecting a particular weapon. Its activities in pursuit of producing mass casualty effects included an expedition to acquire the Ebola virus during an outbreak in Africa, attempts to build a high-power laser weapon, and a seeking a device for generating earthquakes.\textsuperscript{182} It may simply have been the case that, working inside a bizarre organisation such as this, Aum’s scientists had insufficient opportunity to develop and test a viable BW program.

A final point to emphasise is that, when Aum conducted its three biological attacks in the early 1990s, the Japanese authorities knew about the cult but were unwilling, or unable, to act.\textsuperscript{183} Aum’s interest in deliberate disease was no secret — on a radio program it sponsored in Russia, the cult had broadcast statements extolling the virtues of BW.\textsuperscript{184} Almost no other terrorist group could function in a developed state with the ease with which Aum avoided the attention of the Japanese authorities. Aum was a cult with official religious status under Japan’s Religious Corporation Law (1951). This Law reflected the strong attitude to religious freedoms in Japan’s post-war constitution — a reaction to the oppressive treatment of new religions in the pre-war era. The Law grants official religions tax exemptions and a high degree of freedom from state intrusion. This special status partly explains the lax approach of the Japanese police towards Aum, even in the face of numerous complaints about suspicious activities.\textsuperscript{185}

At least two factors possibly contribute to the reluctance of Japanese authorities to release information about Aum Shinrikyo. First, they may be ashamed of having failed to thwart the cult’s activities. Second, law enforcement agencies may have been sloppy in their investigations of Aum following the 1995 sarin attack and may not wish to have that carelessness publicised.\textsuperscript{186} Japan may one day choose to release more information about what went on in the laboratories of Aum’s BW program. Until then, the available data seems to indicate strongly that even a well-resourced terrorist organisation may not necessarily find it easy to carry out a successful biological attack.

The Aum experience certainly stands in marked contrast to the myriad statements by some government officials and journalists claiming that the preparation of BW could be carried out in ‘kitchens’, ‘bathrooms’, ‘garages’,
and 'home breweries', and is a matter of relative ease and simplicity. BW terrorism is a horrific prospect, but one which requires perpetrators to have a precise configuration of motivation and capability.
From Part I which focused on BW or deliberate disease, Part II now moves to security threats posed by naturally occurring infectious diseases. At the outset, it is important to examine the history of disease and the way in which human activity and interaction with animals have been the prime factors in the movement and mutation of micro-organisms over time. The ways in which diseases have encountered and affected humans in the past have implications for resisting disease in the future. The Spanish influenza pandemic of 1918-1919 killed 20-25 million people worldwide. For any security analyst the relevance of epidemics of this magnitude and the importance of preventing future outbreaks should be clear.\textsuperscript{188} In Northeast Asia, two infectious diseases posing particular security challenges are the AIDS and SARS viruses. Part II includes a case study of each.

Before exploring the security dimensions of naturally-occurring diseases, it is worthwhile clarifying two terms that are sometimes confused - 'infectious' and 'contagious'. A disease is 'infectious' if it is caused by a specific micro-organism. Other diseases, such as eczema and skin cancer, do not come into this category because they are caused by exposure to a toxic chemical and radiation respectively. There are also diseases that result from faulty genetic codes in a person’s cells. An infectious disease is 'contagious' if it can be passed from person to person by ordinary social contact – for example, the common cold, chickenpox and measles. A disease like AIDS, while infectious (it is caused by a virus), is not called contagious because it needs extra activities like sexual intercourse to get passed around. Other diseases rely on animal or insect vectors to spread from one human to another – for example malaria (mosquitos) and bubonic plague (rats and fleas).\textsuperscript{189} When analysing disease for security purposes, the issue of whether a disease is infectious has broad relevance to how it may be prevented and treated medically. The extent to which a disease is contagious has even greater implications in a short-term sense when considering strategies for containment and mass medical treatment. For example, the security challenges of responding to SARS (a highly contagious disease) are quite distinct from those relating to AIDS, which is not as easily transmitted.

1. The Once and Future Plagues of Asia

Over many centuries, changes in human ecology – a society’s culture, habitat and relation to the environment – have resulted in various shifts in
the patterns of population disease.\textsuperscript{190} In the case of infectious diseases, most medical scientists in the developed world had, until very recently, thought disease-causing microbes were a thing of the past. And so attention shifted to other illnesses like cancer, diabetes and heart disease. This was never the case in the developing world where health problems associated with infectious diseases have been ongoing. Today, however, both the developed and developing world share the challenge of emerging and re-emerging infectious pathogens. Despite rapid advances in medical science, nature remains the greater innovator when it comes to disease. SARS is only the most recent in a series of new infectious diseases emerging in the last 30 years. Others include Legionnaires’ disease, AIDS, Ebola and variant Creutzfeldt-Jakob Disease (vCJD). In the case of known bacterial diseases, the widespread misuse of antibiotics has gradually made many bacteria more resistant to treatment. Strains of some species, for example Mycobacterium tuberculosis which causes TB, already evade every available drug. Also emerging are new, deadlier varieties of age-old ailments such as cholera, pneumonia, malaria and dysentery.

Broadly speaking, the likelihood of individuals coming into contact with deadly infectious diseases is increasing due to globalisation, modern medical practices, urbanisation, climate change, and changing social and behavioural patterns.\textsuperscript{191} The following section focuses on the history of human disease and prospects for the future, with particular emphasis on those aspects relevant to the Northeast Asian region. In considering once and future plagues, the two most important factors are the animal origins of disease and the impact of human activities.

A. Animal Origins

Around 10,000 years ago, when humans first shifted from the hunter/gatherer existence to farming with domesticated animals, settled communities came into close contact with the infectious microbes present in their herds. Here were the origins of such diseases as smallpox, measles, chickenpox, TB, leprosy, influenza, the common cold, malaria and bubonic plague.\textsuperscript{192} Today, animal microbes jumping to humans, through a process known as ‘zoonosis’, are the greatest source of new infectious diseases. Recent arrivals via this route include the Ebola virus and vCJD, which derives from bovine spongiform encephalopathy (BSE) or ‘mad cow’ disease.\textsuperscript{193} There is a consensus emerging that the HIV/AIDS virus came from African apes.\textsuperscript{194} The movement of animal microbes into human hosts has largely been brought about by the misuse of antibiotics, the trade in wild animals, and by the prolonged, intense co-existence of livestock with farmers.
The intensification of food production and processing methods is increasingly affecting infectious disease patterns. For example, in animal husbandry, antibiotics are mixed into stock feed to promote growth. Long-term exposure to low doses is the perfect formula for the selection of resistant bacteria. The treated animals may then pass on these super-microbes to farmers and to people who prepare and consume undercooked meat. In the US, the trade in wild animals, whether as pets or for consumption, has recently been put under the health and security spotlights. The likely source of the 2003 monkeypox outbreak in the US was a Gambian giant rat, imported from Ghana, which came into contact with prairie dogs at a Chicago-area pet distributor. When the pet owners in turn presented with symptoms of monkeypox, this was the first time the exotic disease had ever appeared in the US. Following the outbreak, an editorial in The Lancet went so far as to suggest that the importation of wild animals, as a potential threat to human health, should be administered by the US Department of Homeland Security.

Close human contact with farm animals is the primary cause of microbes jumping into humans. Pigs can act as a bridge for viruses because they are biologically very similar to humans, but also similar to other non-human animals. This can happen, for example, where pigs live in close proximity to both humans and birds — many influenza viruses are of avian origin. Chinese farming practices, for example, provide an ideal environment for viruses to mutate and jump between species. Throughout southern China, chickens are farmed alongside fish farms where ducks swim in the water, and pig manure is often fed to the fish. And amidst all this animal interaction lives the Chinese farmer. The SARS virus, which originated in China’s Guangdong province in late 2002, almost certainly appeared in humans as a result of these conditions.

Since the late 1990s it has become increasingly clear that live poultry markets are potential breeding grounds for the disease of most concern to epidemiologists — influenza or flu. In 1997, avian influenza H5N1 broke out in chicken farms in Hong Kong. Eighteen people caught the infection and six died. This was the first recorded instance of a purely avian virus causing respiratory illness and death in humans. The properties of that flu strain were not well known, but the killing of all poultry in Hong Kong’s markets and farms was a precaution that may well have averted a human pandemic of the disease. In February 2003 a variant of the flu, similar to one that showed up in wild birds in Hong Kong in late 2002, infected two of the city’s residents — one of whom died as a result.
In October 2003, humans in Vietnam started presenting with symptoms of an influenza strain (H5N1 again) affecting poultry that subsequently appeared throughout eastern Asia. As of mid-February 2004, bird ‘flu had swept through Laos, Cambodia, China, Taiwan, Japan, South Korea, Indonesia, Vietnam and Thailand. Twenty-two people had died from the virus. As was the case in the 1997 clutlrreak, human victims had caught the disease from animals. But scientists expressed fear that the avian virus might somehow adapt itself to spread from person to person as easily as the common flu. Were that to occur, its ability to kill would far exceed that of SARS. The primary response of authorities in affected countries was the slaughter of millions of geese, chickens and ducks. Such was the fear generated by bird flu that governments were compelled to protect people from their own animals. In some places, where local workers were too afraid of infection, military units were deployed to carry out large-scale culling operations.

B. Effects of Human Activity

In addition to farming practices that have stimulated zoonosis, human activities have led to disease emergence primarily through the processes of globalisation and population expansion. The gradual globalisation of the world’s population over the centuries has now reached the point where aircraft-borne microbes can be carried long distances at high speed. And population increase has forced the inhabitation and development of previously unoccupied environments containing hitherto unknown microbes. It is quite possible that land clearing and the leaking of chemicals and radioactive materials into the environment have released diseases previously contained by geography. Human agency has also been the cause of the re-emergence of known diseases, once thought to have been on the decline, in new and deadlier guises as a result of antibiotics misuse.

In Asia, the first great historical transition in which infectious diseases equilibrated between interacting populations occurred around 2,000 years ago. Epidemic infections such as smallpox and bubonic plague were exchanged between the European and Asian ends of the Eurasian supercontinent via the imperial powers of Rome and China. Later, during the third and fourth centuries AD, the introduction of smallpox and measles led to the catastrophic halving of the northern Chinese population. Plague, smallpox, mumps and measles then spread through Japan during the five centuries following 552AD when Buddhist missionaries from the Asian mainland first arrived. During the fourteenth century, the combination of bubonic plague (the Black Death) and war with their Mongol overlords led to the estimated halving of China’s population. In time, the movement of
populations gradually led to the arrival of infectious diseases still endemic to many Asian countries today. As a result of the thorough interconnectedness of globalisation, various infectious diseases are now equilibrating at a global level. Examples include cholera, AIDS, TB, and the resurgence in tropical regions of mosquito-borne malaria and dengue fever. Within livestock too, the international spread of BSE, foot and mouth disease and various strains of salmonella demonstrates the increasing connectedness of animal populations worldwide.

A principal cause of the re-emergence of old diseases in deadlier forms has been antibiotics abuse. Antibiotics are chemicals produced by micro-organisms to fight other micro-organisms, usually bacteria. But for the target bugs, that which does not kill them only makes them stronger. Shortly after finding the antibiotic properties of penicillin in 1928, Alexander Fleming also found that bacteria adapted so as not to be affected by the compound. He was anxious that great care should be taken in the use of antibiotics and warned against self-medication using inadequate doses. Taking antibiotics for too short a time causes the bacteria that are very susceptible to be killed, but those with partial resistance survive and seek out other hosts in which to multiply.

Decades after Fleming’s warning, incomplete treatment regimes, inappropriate clinical applications, and the inadvertent and deliberate sub-therapeutic use of antibiotics are resulting in the evolution — through human selection — of highly resistant and virulent strains of disease organisms. Each year in the US, physicians write $US50 million worth of antibiotics prescriptions that are ineffective and unnecessary. Most colds, flus and sore throats are caused not by bacteria but by viruses against which antibiotics are useless. But other bacteria in the patient’s body that happen to encounter the antibiotic then have an opportunity to develop resistance to it. Antibiotics can still be purchased over-the-counter in many countries around the world. With little or no control over the use of such medication, bacteria quickly develop resistance. In 1995, medical scientists were alarmed by a case of multidrug-resistant Yersinia pestis (plague) in Madagascar. Some strains of other bacterial species, for example Mycobacterium tuberculosis, are already sufficiently resistant as to circumvent every available antibiotic — some 100 drugs.

Superbugs like this pose a greater risk to human life than their less-resistant ancestors and demand more expensive remedies. In 1990, there was an outbreak of antibiotic-resistant TB in New York that cost authorities $US1 billion to contain. Beyond the misuse of antibiotics, the problem of bacterial resistance may extend even further. Another way to fight germs is
by using artificial compounds called antimicrobials. Triclosan, for example, is a powerful antibacterial and antifungal agent incorporated into products such as bedding, socks, garbage liners, chopping boards, soaps and toothpastes. Some scientists have found evidence that Triclosan effectively acts like an antibiotic, and that some micro-organisms are becoming resistant to it.\textsuperscript{215} It is clear that the threat to human life posed by resistant micro-organisms, while arising out of natural processes, is greatly amplified by human activities.

This section has so far dealt generally with the phenomena of emerging and re-emerging infectious diseases. What follows are cases studies of the security implications of two recently-emerged diseases that pose a particular threat in Northeast Asia — AIDS and SARS.

2. AIDS: a Slow, Subversive Killer

The HIV/AIDS virus is a subversive threat in the way it makes infected populations more vulnerable to other diseases. As an HIV-infected person’s white blood cell count falls, their immune system is weakened and they become susceptible to pathogens that their body would otherwise be able to fight off. The term ‘AIDS’ is used once a person starts to suffer from infections and tumours that have been able to move in on a depressed immune system.\textsuperscript{216}

One of the most damaging aspects of the virus in the countries in which it is endemic is the way it strikes down people at an age when they have most to contribute to society and would normally require little health care. At a societal level, an epidemic like AIDS brings immense socio-economic costs including:

- a decline in income when breadwinners sicken and die;
- mounting costs for health care and burial;
- the depletion of household savings;
- children leaving school to work or care for sick relatives;
- a drop in food consumption; and
- a worsening of poverty and malnutrition.\textsuperscript{217}

For Dupont, the HIV/AIDS virus also has strategic implications because of its ability to destabilise countries politically, to reduce state capacity by using up scarce resources, and to hollow out military forces. This is especially so in poorer countries that cannot afford high standards of health care.\textsuperscript{218}

He describes HIV/AIDS as representing a new genre of infectious disease
whose effects on human life in the developing world are so detrimental as to have a security fall-out commensurate with armed conflict and major war.\textsuperscript{219} This is illustrated by the Commission on Human Security report to the UN that, as of 2003, 22 million people worldwide had died from AIDS and 40 million were infected with HIV. The disease will soon overtake the two world wars of the twentieth century, the 1918 influenza epidemic and the Black Death of the fourteenth century as the greatest health catastrophe in human history.\textsuperscript{220}

After sub-Saharan Africa, Asia is the world’s most heavily AIDS-affected region. When SARS hit China, some of the most vulnerable people would have been those with HIV/AIDS.\textsuperscript{221} The HIV epidemic also exacerbates the burden of TB in Asia. In 2000, around 1.8 million people around the world died from this disease. Twelve per cent of these deaths were attributable to HIV. In Asia, more than two million people are co-infected with TB and HIV.\textsuperscript{222} AIDS and TB do not generate panic in the same way as SARS and other similarly fast-spreading, exotic diseases. However, they result in far greater rates of human morbidity (infection) and mortality (death), and so cause significant, long-term erosion to societies and economies.\textsuperscript{223} In 2001, figures for AIDS and TB in Northeast Asia were as follows:

\textit{Table 1: AIDS and TB in Northeast Asia, 2001}\textsuperscript{224}

<table>
<thead>
<tr>
<th></th>
<th>China</th>
<th>Japan</th>
<th>N Korea</th>
<th>Russia</th>
<th>S Korea</th>
<th>Taiwan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated number of people</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>with HIV/AIDS</td>
<td>500,000</td>
<td>10,000</td>
<td>&lt;100</td>
<td>&lt;100</td>
<td>&lt;100</td>
<td>5,221</td>
</tr>
<tr>
<td>- &lt;1 million</td>
<td></td>
<td></td>
<td>&lt;1000</td>
<td>&lt;1000</td>
<td>&lt;1000</td>
<td></td>
</tr>
<tr>
<td>Estimated HIV prevalence</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>&lt;0.01</td>
<td>1 - &lt;5</td>
<td>&lt;1</td>
<td>N/A</td>
</tr>
<tr>
<td>rate in adults (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated deaths</td>
<td>5000</td>
<td>&lt;500</td>
<td>N/A</td>
<td>1000</td>
<td>&lt;500</td>
<td>N/A</td>
</tr>
<tr>
<td>due to AIDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &lt;10,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated number of TB cases</td>
<td>1,447,947</td>
<td>44,954</td>
<td>37,852</td>
<td>193,363</td>
<td>32,787</td>
<td>N/A</td>
</tr>
<tr>
<td>in 2001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB cases per 100,000 population</td>
<td>112.7</td>
<td>35.3</td>
<td>168.8</td>
<td>133.7</td>
<td>69.7</td>
<td>63.0</td>
</tr>
<tr>
<td>Estimated adult (15-49y) TB</td>
<td>0.4</td>
<td>1.0</td>
<td>N/A</td>
<td>0.1</td>
<td>0.1</td>
<td>N/A</td>
</tr>
<tr>
<td>cases that are HIV+ (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Apart from the great human cost of AIDS, measured in terms of the sheer number of lives lost, the disease also constitutes a threat to national security. For example, the HIV/AIDS epidemic has rendered South Africa unprepared to meet its external and internal security obligations, incapable of fulfilling its economic potential, and ill-equipped to provide its citizens with their basic social and health needs. In Russia, AIDS is spreading more quickly than in any other country in the world. The disease is expected to exacerbate Russia’s population decrease — projected to fall by 12-13 million in less than 25 years — and the associated potential security consequences. Peterson contends, for example, that AIDS could erode the country’s ability to staff a conventional army and lead Moscow to rely more heavily on its nuclear capabilities to maintain its security.

For China, there is a danger that the potential economic losses from the AIDS epidemic could undermine the gains made by recent economic reforms. With communist ideology seen as increasingly irrelevant, but with the communist leadership resisting democratisation, the legitimacy of the Chinese government is largely based on a nationalistic pursuit of economic growth. The internal security problems created by AIDS in China are worsened because many Chinese blame the government for the crisis. For example, only recently has the government acknowledged the epidemic publicly, thereby clearing the way for more effective preventive measures. More significantly, it was government actions that directly helped AIDS spread throughout central China in the first place. There, government-owned blood collection centres set up in the early 1990s paid poor peasants $US4-12 to donate blood. At these centres, blood from numerous donors (some of whom were HIV positive) with a common blood type was pooled and centrifuged to separate out the plasma. The leftover mixture of red blood cells was then reinjected into donors to enable them to give blood more frequently. In the populous central Chinese province of Henan, an estimated 370,000 people now carry the HIV/AIDS virus.

This deadly legacy of reckless government action makes it all the more important that China deals adequately with AIDS in the future. Without sufficient prevention and treatment measures, the rising human cost of the disease could eventually prove too great a burden for the Chinese government to bear. Among Northeast Asian countries, Russia too is particularly vulnerable in this regard.

The case of AIDS demonstrates how the sheer weight of human illness and death can impose a disease security burden. Infectious diseases that might exact a lesser toll, but which are highly contagious, can also constitute a security threat because of the panic and instability they cause.
3. SARS: the Security Challenge of a Fast-Spreading Germ

In contrast to the slow, subversive security threat posed by AIDS, other infectious diseases emerge suddenly and spread quickly, taking countries by surprise. In many ways, outbreaks of such diseases generate consequences comparable to those of a BW attack — panic, uncertainty, and the overwhelming of stretched public health resources. SARS, a hitherto unknown disease which sprang from southern China in late 2002, provides a stark illustration of the security implications of a fast-spreading germ. In terms of lives lost, the panic reaction to SARS was, in hindsight, out of proportion to the threat it posed relative to other diseases. In China alone, over 100,000 people die each year from TB and there are projected to be 10 million Chinese with HIV/AIDS by 2010. Even so, there was something about this new and mysterious illness that generated a level of human dread disproportionate to its ability to kill. The security dimension of SARS was as much bound up in rampant fears of dying as in the actual number of deaths it caused.

The global response to the 2003 SARS outbreak provides lessons for dealing with similar disease security threats in the future. In Northeast Asia particularly, the poor response to SARS by governments underscored how ill-prepared and vulnerable this region is to mass outbreaks of deadly diseases, whether naturally occurring or deliberately inflicted. The outbreak demonstrated the enormous practical and political difficulties associated with containing a highly contagious disease. Ultimately, national measures proved grossly inadequate and sovereign governments were forced to cooperate against a transnational security threat that knew no borders.

The first known cases of the disease that became known as SARS occurred in Guangdong Province in southern China in late November 2002. On 11 February 2003 the WHO was alerted to an outbreak of atypical pneumonia in the area which had reportedly infected 305 people and caused five deaths. Later that month, a doctor who was inadvertently carrying SARS travelled from Guangdong’s capital Guangzhou to Hong Kong where he stayed in a hotel. There, the virus was transmitted to local residents and travellers, who in turn transmitted the disease to others when they returned to Vietnam, Singapore, Canada and Taiwan.

Just as a contagious disease is no respecter of national borders, in a globalised world it is also impervious to government cover-ups. After 15 March 2003, when the WHO issued its first global warning about the SARS virus, China’s government-controlled media was prohibited from reporting on the warning. Already, however, news of the virus was circulating around the country and the world via mobile phones, email and the internet.
China was roundly criticised over its refusal to cooperate earlier with the WHO, as this probably allowed SARS to spread further. Not until 2 April 2003 was the WHO allowed to visit Guangdong to confirm that the alert it had received, nearly two months before, was consistent with a mystery disease that was by then appearing in hospitals around the world. On 17 April it was finally established that the causative agent was a coronavirus, similar to that which causes the common cold. This meant diagnosis, treatment and containment of SARS could at last be improved and accelerated.

The case fatality rate of SARS is around 11 per cent, but with much higher rates among the elderly and people with AIDS. As of 7 August 2003, by which time SARS has virtually disappeared, there had been 8,422 cases of the disease and 916 deaths worldwide. Northeast Asia had been affected as follows:

Table 2: SARS in Northeast Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>China (mainland)</td>
<td>5,327</td>
<td>348</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>1,755</td>
<td>298</td>
</tr>
<tr>
<td>Taiwan</td>
<td>665</td>
<td>84</td>
</tr>
<tr>
<td>South Korea</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Russia</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Japan</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>North Korea</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>7,751</strong></td>
<td><strong>730</strong></td>
</tr>
</tbody>
</table>

The response to SARS by governments, domestically and co-operatively, was largely dictated by the nature of the disease threat they faced — its origins, symptoms and modes of transmission. A theory on the origins of SARS, now widely accepted, is that the causative coronavirus, usually found in animals, jumped species to find a new home in humans. Farming conditions in southern China, where the virus first appeared, may have stimulated this phenomenon. As discussed in an earlier section of this paper, southern China has high-density populations living in constant close proximity with animals — for example, pigs kept and fed in backyards to be sold for pork. Influenza experts have pinpointed this part of the world as a
prime source of dangerous new flu strains where viruses from pigs, people and birds exchange genes and mutate.235

In the search for the original animal reservoir of the disease, the presence of viruses almost identical to SARS has been detected in masked palm civets, a raccoon dog and a Chinese ferret badger. All three species are sold as delicacies for human consumption throughout southern China. However, the true reservoir of the virus may be an entirely different species.236 Chinese agriculture authorities, unconvincing of a link between exotic animals and SARS, have procrastinated over imposing a ban on the selling and eating of more than two dozen species. This indecision reflects the competing interests inside China’s bureaucracy. Health officials would be blamed if SARS resurfaced, but agricultural authorities are eager to protect farmers’ incomes and for years have encouraged them to move into high-value areas including wild animal breeding.237 Outlawing the hunting, processing, preparation, purchasing, slaughtering and consumption of wildlife would bring to an end traditional cuisine in southern China that is centuries old. If China’s disease security one day required such a measure, it would have great implications for the commercial livelihoods of many Chinese.

Diagnosis of SARS during the 2003 outbreak was made difficult because the initial symptoms of the disease resemble those of flu — body ache, fever, chills, headache, sore throat — before progressing to a dry cough and breathing difficulties.238 If SARS were to reoccur at the same time as an influenza outbreak, health systems around the world would likely be under extreme pressure. Hospitals would be compelled to isolate all those who appeared to have either SARS or flu until such time as a proper diagnosis could be carried out. China learned some hard lessons after the first SARS outbreak and has taken steps to be prepared for a second. For example, many hospitals in major cities now have added space for isolation wards. The Shanghai local government has designated a second infectious disease hospital and instructed other hospitals in the city to have plans to clear space for smaller isolation wards. Similar plans are in place in Beijing and Guangzhou.239

Person to person transmission of the SARS virus occurs mainly from face-to-face exposure to infected respiratory droplets expelled during coughing or sneezing, or following contact with bodily fluids during medical interventions.240 Significantly, 20 per cent of SARS cases were among health workers and a large number of the early infections occurred in hospitals.241 This served to exacerbate the problem of having too few medical staff to diagnose and treat patients. In dealing with the high transmissibility of the virus, the overall response to SARS frequently crossed the line between
public health and 'hard' security. For example, containing the disease required measures including:

- the closure of schools, hospitals and interstate borders;
- the use of tools designed for tracking criminals to identify and trace those who may have been exposed to SARS; and
- the use of military personnel to assist in enforcing quarantine orders.242

China instituted a set of draconian legal and policy measures to combat SARS. Anyone who knowingly spread the disease could have faced capital punishment. Those who broke quarantine or evaded a compulsory medical examination or treatment, and accidentally passed on the illness, faced up to seven years imprisonment.243

The 2003 SARS outbreak provoked levels of emergency response and media attention on a scale that has very likely changed the way people perceive the risks associated with emerging epidemic diseases. The event has probably shaken many people out of their complacency towards infectious diseases. A renewed fear of disease could provoke governments and health authorities to boost public health spending, authorise research into new drugs and treatments, and increase international cooperation. In particular, the SARS outbreak could turn out to be a watershed moment when the world was forced to acknowledge the international interdependent nature of global public health. For Prescott, when it comes to infectious diseases, 'developed countries must accept that they are only as secure as the world’s weakest public health system and for as long as it takes a passenger to travel from that location.'244

The initial positive legacy of the SARS outbreak includes new surveillance and reporting techniques, methods of data management, mechanisms for collaborative research, new procedures for infection control, and channels for informing and educating the public.245 However, a SARS vaccine might not be available for at least three years. Nobody has attempted to develop a coronavirus vaccine for humans because until now such infections, typically the common cold, rarely killed people. Without a clear indication that SARS will make a devastating return, pharmaceutical companies might not be interested in spending millions of R&D dollars on a new drug.246 Where the private sector sees no commercial imperative to develop anti-SARS measures, government may have to foster such efforts in the interests of securing themselves and their populations against future disease-based threats.

Natural plagues, new and re-emerging, are a clear threat to security. Animal-borne micro-organisms are adapting to human hosts at an increasing
rate, and human activity continues to stimulate resistance in some pathogens. AIDS and SARS both pose a security threat in Northeast Asia, but in different ways — AIDS by the sheer number of lives it endangers, and SARS by the panic and disruption it causes. When these natural infectious disease threats are combined with the spectre of BW, the question arises: what are the best policies and practices for pursuing disease security?
This paper has so far examined the security threats posed by infectious diseases, whether deliberately deployed or naturally occurring. An infectious disease becomes a security threat when its effects reach the point of imposing an intolerable burden on society. That burden can be measured in terms of the number of people infected and killed, and by the level of disruption and instability that accompanies the disease. The purpose of Part III is to assess critically the measures that have been and could be applied in Northeast Asia to enhance disease security. Against the threat of BW, military and intelligence responses include tactical response units, deterrence of BW use by threat of nuclear attack, the use of force to destroy BW assets, and the new Proliferation Security Initiative (PSI). The BWC, although not a verifiable disarmament treaty, also offers scope to address BW and other disease security issues. In the context of the Northeast Asian region, key BWC issues are the security calculations involved in achieving disarmament on a regional level, and national legislation for implementing the Convention. Of great significance to dealing with both BW and infectious diseases generally via the BWC is the vexed issue of non-proliferation in the interests of security versus the transfer of biotechnology for development purposes.

The most promising approach to disease security is through enhanced public health capabilities. This is essentially a dual use response applicable both to BW and to naturally occurring outbreaks of infectious diseases. The two main pillars of security through public health are disease surveillance networks (domestic and international) and robust public health systems. To illustrate the importance of pursuing security in this way, Part III concludes with a case study of China. This examines the spectrum of Chinese disease security issues: from China's policy on BW, to its special vulnerability to infectious diseases, to the shortcomings of the Chinese health care system.

1. Military and Intelligence Responses to BW in Northeast Asia

Responses to the BW threat by military means include specialist response units, deterrence of BW use by threat of nuclear attack, and the use of force to destroy BW assets. For agencies charged with gathering and assessing BW-relevant intelligence, numerous challenges arise primarily due to scientific issues. These are well demonstrated by the US experience of searching for WMD after its 2003 invasion and occupation of Iraq. For the
purposes of non-proliferation in Northeast Asia, it remains to be seen whether the multilateral PSI will be successful in interdicting BW program ingredients.

A. Tactical Response Units

Faced with the prospect of nuclear, biological, chemical (NBC) and possibly radiological attacks, governments have shown an inclination to form specialist units within their military forces intended to counter the full panoply of WMD threats. In February 2002 South Korea’s Defense Ministry launched its Chemical, Biological and Radiological Defense Command aimed at defending against an attack by North Korea. The unit features biological detection vehicles, based on US technology, designed to identify, analyse and decontaminate a range of BW agents. Japan too is aiming for functional improvement in the areas of specialist NBC personnel and equipment, particularly countermeasures against BW. Following the Tokyo sarin attacks of March 1995, the Japan Defense Agency set up chemical attack response brigades in 13 prefectures. The force presently totals 660 troops. Equipped to detect and identify chemical and biological agents, the purpose of these brigades is only to warn other troops and authorities — they have limited local clean-up capabilities.

The challenge for multi-tasked units of this sort is that attacks utilising different scientific processes produce vastly different consequences. A 1999 report by the US National Academy of Sciences highlighted how pairing off CW and BW inappropriately blurs the important scientific differences between the two. A practical consequence of this has been that the numerous US ‘chem/bio’ response teams are, in fact, almost entirely focused on detection, decontamination, and treatment of casualties in a chemical attack scenario only. It seems to be the case also that most of Japan’s NBC response efforts are directed towards protection only against CW. This lack of operational emphasis on BW contingencies may in part be due to assessments, by the US and Japan, that CW attacks are more likely. But it probably also reflects the scientific difficulties of having analytical capabilities as advanced for biological agents as for chemical agents. A later section of this paper discusses the intelligence challenges of detecting and identifying BW.

Traditional military approaches to detecting and protecting against BW on the battlefield are not necessarily suitable or easily adapted for use in a peacetime civilian setting. Typical first responders (fire and police) are not sufficient for containing the effects of a biological attack, and nor are specialist NBC defence personnel. A rapid response capability simply does not apply
where, as would most likely be the case, no-one even knows a biological attack is going on. As disease agents have incubation periods lasting days or weeks, a BW attack is likely to bypass traditional first responders and rapid response units. Such personnel are better equipped to deal with disasters, such as a CW or conventional attack, whose impact is felt immediately. In a BW attack scenario, the first responders will be doctors, pathologists and other health professionals, and the speed of their response will depend on how quickly they recognise that certain illnesses appear out of the ordinary.\(^{251}\)

In November 2003 around 170 officials from the Tokyo city government and fire department participated in a role-playing drill, the premise of which was that the smallpox virus had been released in a Tokyo subway.\(^{252}\) The problem with such a drill, undoubtedly inspired by the experience of Aum’s 1995 subway attack, is that the participants would presumably have known that an attack of some sort was underway. In reality, the deliberate release of smallpox would likely be covert and not discovered until days or weeks later when patients began presenting symptoms at hospitals and doctors’ surgeries. Clearly, knowing whether an attack is underway is crucial to any BW response. The October 2001 anthrax attacks in the US were exceptional because the envelopes containing the spores also contained letters advising the reader to take antibiotics. When Aum Shinrikyo attempted to disperse anthrax bacteria and botulinum toxin during the early 1990s, the attacks remained unannounced and their occurrence did not come to light until cult members faced trial several years later. Similarly, members of the Rajneeshee cult did not announce in 1984 that they had sprinkled salmonella in salad bars in the Oregon town of The Dalles. The discovery that the subsequent outbreak of food poisoning was not a natural occurrence happened a year later when informants led authorities to a cult laboratory containing the same bacterial strain of salmonella.\(^{253}\)

B. Deterrence by Threat of Nuclear Attack

In Northeast Asia, China and possibly North Korea wield strategic leverage by virtue of a nuclear deterrent capability. While this may be useful in the face of conventional and other nuclear challenges, it is doubtful whether a nuclear state could rely on NW to deter BW use against it. In principle, the great psychological impact and potential destructiveness of a threatened NW response would cause any potential BW user to hesitate. In practice, however, targets for NW retaliation could prove too obscure. And the use of NW to punish BW use by a state may be so disproportionate a response as to be politically indefensible. In the case of terrorists, it is doubtful whether the kind who would use BW could ever be deterred.
The implied assumption underlying any discussion of NW as a deterrence tool is that there is a BW perpetrator whose identity and location is known and against whom threats and retaliation strikes can be directed. The launch of a ballistic missile by and from a particular state, for example, would almost certainly be noticed by virtue of its telltale heat signal. Assuming it were not intercepted and destroyed in flight, the absence on impact of a nuclear explosion or instant chemical effects would immediately arouse suspicions that the missile warhead carried a biological payload. However, for these very reasons, ballistic missile delivery of BW is highly unlikely. To avoid retaliation, it is in the interests of a BW perpetrator to conceal or obscure the origin and occurrence of the attack. Absent the requirement for explosive dissemination, BW attacks are by nature silent, and the first indications may be days or weeks later when people start falling ill. By this time, it may be too late to track down and punish the perpetrator.

Even assuming the identity and location of a BW perpetrator were known, it is uncertain in what circumstances, and at what point, nuclear retaliation would be a proportionate response to a biological attack. Different biological agents can cause casualties to vastly differing extents, and the ultimate number of deaths would be highly dependent on the efficacy of the target country’s health care system. In contrast to a nuclear strike which instantly causes a large number of deaths, the deadly effects of a biological attack would occur gradually. How many casualties or deaths would have to occur before a BW attack deserved a NW response?

Deterrence as a response to BW is even more problematic when it comes to terrorism. Firstly, highly-organised and disparate terrorist groups may be difficult to locate, isolate and punish. Secondly, deterrence may simply not apply against terrorists who are motivated by religion and who believe they are carrying out the commands of their Supreme Being. Thirdly, for terrorists pursuing an apocalyptic objective, a devastating nuclear response to their BW attack might be just what they want to provoke.

Beyond considerations of the effectiveness of a NW-based deterrent, there is doubt about the general desirability of such an approach. Sagan argues that the US should not use nuclear threats to deter BW use because, firstly, it is harmful to NW non-proliferation efforts. Such a policy, if explicit, would serve to legitimise nuclear threats and thus encourage non-NW states to adopt the US method of avoiding BW attacks. Secondly, nuclear threats increase the risk that BW will actually be used. Leaders of BW-equipped regimes, fearing a ‘nuclear decapitation strike’, might pre-delegate authority to use BW to lower level military officers. This carries greater potential for
BW use, either by accident, without authorisation, or as a panic response to false alarms. A third reason not to threaten NW retaliation is that a nuclear threat, to be effective, must also be credible. Arguably, the US cannot make its nuclear threats credible without also creating a dangerous risk that its NW will actually be used in the event of a biological attack.

If addressing the problem of BW is about reducing the possibility of mass casualties, it seems that reliance on NW deterrence is too dangerous a game to play. To the extent that BW threats are characterised by greater invisibility and unpredictability, relative to nuclear threats, the deterrent instrument is likely to be a blunt and ineffective one.

C. Use of Force

In addition to problems of deterring BW use, finding and destroying the BW capability of a state or terrorist organisation is potentially a huge challenge. Since being labelled part of US President Bush’s ‘Axis of Evil’ in January 2002, North Korea has publicly acknowledged that it has an active NW program and may have one or two nuclear bombs. Leaked intelligence reports have detailed US plans for so-called ‘surgical strikes’ on North Korea’s military hardware and its nuclear facilities. Although the US has no stated intention of dealing with North Korea’s suspected BW program in like fashion, the hypothetical endeavour of using force to destroy BW assets would encounter great political and technical obstacles. Politically, surgical strikes inside North Korea would most likely go unsupported by other states in Northeast Asia unless they were convinced the US had given Pyongyang every opportunity to give up its BW program peacefully. South Korea’s President Roh Moo Hyun, seeking to continue his predecessor’s ‘sunshine’ policy towards North Korea, is particularly opposed to the use of force against the North, especially suggestions of pre-emptive military strikes.

From a scientific standpoint, targeting BW stocks is difficult because their manufacture is easily disguised in dual use facilities, such as pharmaceutical plants, that are often located in populated areas. Sites could also be buried deeply underground and require penetrating warheads to get through several feet of concrete. Each facility, uniquely designed, would react differently to a pre-emptive or retaliatory strike. Even if US mission planners could identify a target, they might have no way of destroying it without causing mass casualties in the nearby area. Faced with the task of hitting an isolated surface bunker containing anthrax stockpiles, problems range from possible spreading of the germ, to radioactive fallout from using a low-yield nuclear ‘bunker buster’, to not being able to destroy the anthrax at all. In some circumstances, the use of force to destroy BW assets would
simply not apply. In the case of a contagious BW agent, it may not be necessary to maintain a large stockpile of weapons. By its very nature, a tiny amount of an agent like smallpox could spread disease and death far from the initial point of release. None of these factors, political and scientific, precludes the possibility of the US using high levels of force against a BW suspect. They do, however, provide strong reasons not to do so.

On the whole, responding to BW threats by military means — whether tactical response, nuclear deterrence or the use of force — presents significant challenges. However, there are a number of other avenues for addressing the threat of deliberate disease attacks. The BW problem can be engaged through intelligence, legal and public health mechanisms, and these are often applicable also to defending against naturally occurring disease threats.

D. Intelligence Challenges

The nature of the science behind BW production and proliferation presents huge challenges for those seeking to locate, assess and respond to a BW threat. First, the concealment of BW production facilities is relatively simple because of the technical overlap with legitimate research and commercial biotechnology. Second, many countries could develop a BW program using entirely their own resources, thus limiting the possibilities for interdicting imported ingredients. Third, ongoing advances in genetic engineering, particularly the advent of ‘designer germs’, are making it increasingly difficult for intelligence agencies to identify all biological agents that could pose a security threat.

The case of the 2003 Iraq War arising from WMD allegations demonstrates that accurate intelligence, much less evidence, about illicit activities is extremely difficult to obtain. As of January 2004, when US weapons inspector David Kay resigned as head of the ISG charged with finding WMD in post-war Iraq, no BW had been found after nine months of searching. However, the idea that an item identifiable as a ‘biological weapon’ can be ‘found’ does not generally make any sense. A biological weapon is better described as a process rather than a physical object: a pathogenic micro-organism is chosen, then cultured and produced in large quantities through a fermentation process, inserted into a delivery mechanism such as a spray device, and disseminated in such a way that it survives atmospheric conditions on its way to infecting human targets and causing disease. Finding BW is really about assembling evidence of a working biological warfare program. Evidence of the production of pathogenic agents is not proof positive of such a venture — a means of
agent weaponisation must be apparent as well, and established plans for deployment would confirm an offensive purpose. For example, a vat of anthrax in a liquid slurry form, while it could hardly be intended for an ultimately benign purpose, nevertheless poses little danger to humans. Until the bacteria are dried and treated for aerosol delivery, it is not reasonable to speak of the anthrax as a ‘weapon’.

Imagery intelligence (film, photographs and infra red) on BW obtained from aerial platforms (satellites and aircraft) is made difficult by the easy concealment of a BW program. For example, a biological agent production facility could be located in a city and be virtually indistinguishable from other buildings in a satellite image. Alibek observes that ‘[e]ven the highest resolution satellite imagery can’t distinguish between a large pharmaceutical plant and a weapons complex.’262 In addition, there are the usual problems that attend human intelligence (derived mainly from defectors in the case of BW) which can sometimes be vague, inaccurate or otherwise misleading. Sources may present their own assessments, suppositions and interpretations as fact, and these may actually be false. Misunderstanding by a source is a particular problem when the intelligence relates to high technology, as is often the case with BW. A source might also be seeking to advance a political agenda or may be feeding an intelligence agency disinformation on behalf of the target.263

A large source of BW intelligence is open data, especially that which is published on the internet. Such information can provide indications of the current or near future state of relevant biological technology. In the context of the rapidly accelerating ‘biotechnology revolution’, the challenge for intelligence agencies is how to monitor effectively the sheer quantity of information in this area being posted and exchanged. Published advances in genetic engineering, for example, may have relevance for the future creation of micro-organisms modified to circumvent existing vaccines or antibiotics. This in turn would have great implications for responding to BW with public health measures.

Another important intelligence challenge is information sharing. For the purposes of domestic security, for example, the processes for collecting and sharing intelligence are sometimes incompatible with a traditional criminal law enforcement response to biological terrorism. An act of terror is also a crime to be investigated and punished, or prevented if possible. However, the use of some intelligence may be problematic in this regard. For example, intelligence data is often gathered in ways (and is often so imprecise) that may render it inadmissible as evidence in criminal trial proceedings. By its very nature, intelligence is generally focused on the
future, is much less specific, and is source sensitive. Exposing intelligence information to rigorous scrutiny by the legal system may compromise vital sources and so jeopardise possibilities for preventing BW attacks in the future. Countries seeking to detect and punish the use of BW need protocols in place for interagency cooperation to ensure information and evidence are not wasted.

Among Northeast Asian countries, South Korea has made a particular effort in the area of intelligence responses to BW, from detecting biological agents to the broader sharing of information. In May 2002 the South Korean Defense Ministry announced that it had developed, in partnership with the Daewoo Corporation, vehicle-mounted equipment which uses DNA analysing technology to detect and identify a wide range of biological agents, and to recognise an attack almost immediately after it occurs. South Korea is also drawing support from the US Army’s Biological Integrated Detection System. However, BW detection technology is still in its infancy. Detecting the presence of BW agents is far more difficult than detecting radioactivity or the agent used in a chemical attack. Although new technology is advancing to meet the BW detection challenge, a reliable and deployable system is probably some years away. Moreover, were a BW attack conducted covertly, the chances are remote that a detection device would be on hand at a given location to warn people before they were infected.

To meet the BW threat, South Korea has also undertaken to strengthen information and intelligence exchange with international organisations like the WHO, and with the CIA and Federal Bureau of Investigation. At this level, intelligence sharing on suspicious disease outbreaks is as important to meeting the security threats posed by naturally-occurring infectious diseases as it is to dealing with BW. Faced with the dual problem of deliberate and natural disease, intelligence officials might increasingly have to work with public health officials and devote greater attention to the literature on epidemiology and disease research. Overseas monitoring would need to be expanded to include assessments of, for example: the effectiveness of foreign governments' health care systems; relevant political, social, economic and environmental conditions that affect the emergence and spread of disease; and governments' compliance with international health agreements such as the International Health Regulations (IHR). Poorer countries that may pose little military security danger to others may be the very ones that present a big disease risk because of poorly developed or under-funded public health systems. For intelligence officials interacting with medical professionals, the principal challenge would be to overcome differences in culture and organisation. For example, there are potential incompatibilities between
the transparency required for public health agencies to operate freely, and the confidentiality requirements of intelligence gathering. A later section of this paper discusses disease surveillance measures in greater detail.

E. The Proliferation Security Initiative

The PSI, devised in late 2003, aims to prevent the proliferation of WMD, their delivery systems, and related materials to terrorists and ‘states of proliferation concern’. Such states are designated by PSI participants, most of whom are Western countries. Non-proliferation is to be achieved by stopping the flow of WMD-related items by sea, air or land. The rationale for this novel approach is that increasingly aggressive efforts by proliferators to stand outside or circumvent existing non-proliferation norms require new and stronger actions. The PSI is not explicitly aimed at North Korea but, having been accused of making clandestine shipments of drugs, counterfeit cash and missiles, Pyongyang is clearly a prime target. Suspicious shipments on their way to North Korea have been intercepted before. In April 2003, a French-owned ship carrying 214 aluminium tubes destined for North Korea was intercepted as it entered the Suez Canal. The tubes were suspected of being gas centrifuge components for enriching uranium for nuclear bombs. In May 2003, a ship loaded with 33 tons of sodium cyanide was intercepted before reaching Pyongyang. This is a chemical used to make the deadly CW agent tabun.

Among Northeast Asian countries, Japan is presently the only PSI participant. Its contribution is expected to involve gathering and sharing information about suspected smuggling ships, and bolstering ship inspections in Japanese territorial waters. North Korean defectors have often alleged that Japanese money, goods and technology have flowed to North Korea. This has occurred under the guise of legal trade or through third countries, and often arranged by sympathisers in Japan’s large Korean community. In May 2003, Japanese authorities working with Hong Kong officials raided a Tokyo trading company, Meishin (owned by a Korean), to seize electronic equipment bound for North Korea. The company had tried to export illegally three specialised power-supply devices that could have aided North Korea’s uranium enrichment program or been used in missile-launch devices. Even after the raid, the company tried to export a sensitive electronic scale to North Korea that could have been used in a BW program.

Even setting aside the international argument over whether inspecting ships on the high seas is lawful, it is difficult to see how the PSI would make a valuable new contribution to BW non-proliferation in Northeast Asia. To the extent that North Korea is the principal target, it is important to separate
BW from other WMD. While expressing concern that North Korea is a supplier of missile and possibly nuclear technology, the CIA in its latest report to the US Congress makes no mention of North Korea being a supplier of BW technology.\textsuperscript{272} It might, on the other hand, be in the market for BW program ingredients. Even so, the PSI does not appear likely to overcome the difficulties associated with all the intelligence-based responses discussed previously. For example, interdicting shipments of equipment allegedly destined for a BW program is complicated by the potential use of such equipment in legitimate medical and commercial endeavours.

2. The Biological Weapons Convention

The main instrument of international law on BW is the 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (the Biological Weapons Convention or ‘BWC’). Article I of the Convention bans the development, production, stockpiling and acquisition of pathogenic agents for non-peaceful purposes and the systems for delivering them as weapons. Prior to 2001, the issue attracting most attention was the challenge of verifying compliance with the BWC. An Ad Hoc Group (AHG) of member states had a mandate, granted in 1994, to negotiate a verification protocol to strengthen the Convention. Broadly speaking, confidence in treaty compliance would have been generated by: declarations by member states of existing BW stockpiles and potentially BW-capable facilities; routine and unannounced visits to declared or suspected BW-relevant sites; and investigations of suspicious disease outbreaks.\textsuperscript{273}

The negotiations were brought to an abrupt end in November 2001 when the US decided not to support a draft verification protocol presented by the AHG to the Fifth Review Conference of the BWC in Geneva. Among the stated reasons for this decision was that the proposed regime would ‘allow rogue states or others to develop and deploy biological weapons’.\textsuperscript{274} The international reaction to the US position was generally unfavourable. Nevertheless, without US support, the prospects for BWC verification in the future are bleak, the mandate of the AHG having been withdrawn. Until the Sixth Review Conference in 2006, the BWC member states have instead undertaken simply to ‘discuss, and promote common understanding and effective action’ on BW-relevant issues such as national penal legislation, national oversight of pathogenic agents, responses to suspicious disease outbreaks, disease surveillance, and formulating codes of conduct for scientists.\textsuperscript{275}
Verification aside, in the context of pursuing disease security in Northeast Asia the main BWC issues are:
- the dynamics of approaching BW disarmament at a regional level;
- implementation of the treaty through national legislation; and
- the politics of BW non-proliferation versus biotechnology transfer.

A. Regional Disarmament

Every country (Taiwan not included) in Northeast Asia is a member of the BWC. Attitudes to BW disarmament are tempered by the region’s history of biological warfare, but mostly by its strategic circumstances. The use of BW by Japan (and allegedly by the US) can be recalled by people still alive today. This history lives especially in the political imagination of China, which emphasises how its own experience as a victim informs its policy on BW.276 Strong anti-BW sentiments in Northeast Asia are given further normative strength by the BWC. However, although the norm against BW use creates a powerful stigma for potential proliferators, it requires constant reinforcement in the face of new security challenges. In highly unfavourable or desperate circumstances, some countries might be able to convince themselves and others that BW are no longer an illegitimate means of protecting national interests.

Zanders offers a theoretical approach to the security calculations involved in disarmament, in particular how regional security considerations affect attitudes to the BWC. His starting point is that the rise of regional centres of power after the Cold War means many states now assess the relevance of a global treaty from the perspective of their immediate regional security concerns.277 At a regional level, states are concerned with relative gains, and joining a disarmament regime like the BWC might involve too great a security risk (involving relative losses) if other issues are not addressed simultaneously. For Zanders, responding to the BW threat at a regional level through the BWC involves seeking answers to two questions: (1) how can the regional security environment be ameliorated in order to become conducive to disarmament?; and (2) what strategies are available to optimise the benefits for states under the BWC?278

A key precondition for successful disarmament is a situation of ‘functional equivalence’ of weaponry held by the political entities concerned. Only then can such weaponry be isolated from the overall security equation. Functional equivalence of weaponry between two or more political entities is reached when each assigns that weaponry a similar function in their respective military doctrines. By isolating an arms category and submitting
it to an international disarmament regime, states can achieve absolute gains — disarmament reduces the security deficit produced by that class of weapon, as well as the opportunity costs for maintaining a response to the threat of its use by others.279

According to the Zanders theory, Northeast Asia constitutes a scenario in which functional equivalence of weaponry is non-existent — BW are part of the regional security equation, but only some regional actors are suspected of possessing them. This gives such countries a relative advantage over their neighbours that they cannot achieve by other means, so the preconditions for disarmament do not materialise. In Northeast Asia, it may be that suspected BW states would require some sort of security guarantee before disarming themselves of their germ capability.

A problem with the ‘functional equivalence’ argument, however, is the way in which it treats weapons categories, in this case BW, in isolation. Even though the general thrust of this paper has been to emphasise the scientific uniqueness of BW, it is a reality in political circles that BW are often lumped together with CW and NW. In line with this perception, however flawed on scientific grounds, it might be more appropriate to speak in terms of functional equivalence of WMD. For some states making strategic calculations about disarmament at a regional level, it may be the substantive ‘mass destruction’ element that really counts, not the particular form (NW, CW or BW) in which it comes.

Indeed some countries are convinced that all three categories of WMD should be prohibited as part of a coherent international law regime. Without that, BW (and CW) disarmament is thought to be unfair and unsafe in a strategic landscape featuring NW adversaries. Syria, for example, has asserted its right to acquire a BW and CW deterrent to counter Israel’s nuclear capability.280 Other countries say that linking nuclear, biological and chemical weapons will preclude progress in achieving BW disarmament. Arguably, it was the absence of linkage that ensured the successful entry into force of the verifiable Chemical Weapons Convention (CWC) regime in 1997. However, such selectivity allows the few NW states to maintain immense strategic leverage. There is a danger that this situation could threaten eventually to undermine the will of non-NW states to uphold the BW and CW disarmament regimes.281

Although the regional security dynamics of Northeast Asia do not appear broadly favourable in a BWC context, the Convention is about more than just disarmament writ large. To the extent that BW concerns go beyond considerations of actual ‘weapons’, some BWC provisions provide scope for enhancing disease security generally within the region.
B. National Implementing Legislation: a Survey of Northeast Asia

Article IV of the BWC requires each member state to adopt appropriate legal measures to ensure that the treaty's fundamental prohibitions, contained in Article I, are enforceable in national law throughout its territory. The two major dimensions of domestic legal measures are criminal law enforcement and the internal regulation of BW-relevant materials and information. This section provides a survey of BWC legislation as it has been implemented by countries in Northeast Asia. The information is derived from statements by country representatives at BWC meetings and from a database of implementation legislation prepared by the Verification Research, Training and Information Centre (VERTIC). The latter was one of numerous documents prepared for the First Meeting of BWC member states in Geneva in November 2003. In accordance with a resolution of the Fifth BWC Review Conference, the purpose of the First Meeting was to discuss national penal legislation and national oversight of pathogenic agents.

In the cases of Taiwan and North Korea, both countries of BW concern, it is difficult to discern through public sources what measures are in place to govern pathogenic agents and related equipment. Taiwanese legislation is not included in any official lists because it is not eligible to join the BWC. Although North Korea is a member of the Convention, VERTIC was unable to identify any relevant legislation to enforce its provisions. This is not of itself cause for alarm — when VERTIC conducted its survey, it acknowledged that many countries likely did not provide advice on domestic legislation because of translation issues or a lack of administrative staff to carry out such a task. On the other hand, North Korea is governed by a military dictatorship rather than the rule of law, so there are grounds for concern that BW-relevant materials and equipment might not be subject to adequate controls. South Korea, by contrast, has recently enacted BW-relevant legislation relating to export controls and counterterrorism. It also has laws in place, dating back to the 1950s and 1960s, to deal with plant, animal and human contagious diseases. An active participant in processes for strengthening the BWC, South Korea has also contributed a working paper analysing concepts for national implementing legislation to assist other member states.

China has instituted a number of laws and regulations to prevent the non-peaceful use of dual use biological agents and related technologies. It also has legislation to deal with naturally occurring disease threats. The relevant areas include criminal law, import licensing, export controls, customs, quarantine (for humans, animals and plants), prevention and control of infectious diseases, responses to public health emergencies (for
example, measures for reporting, controlling and treating SARS), and biological safety including facility construction and storage of bacteria species.\textsuperscript{288} China has also demonstrated an interest in assisting other countries to implement similar laws. For the First Meeting of the BWC member states in November 2003, it contributed a working paper on national implementation of biosecurity and oversight mechanisms.\textsuperscript{289}

In the early 1990s Russia began adopting laws and regulations aimed at excluding the possibility of BWC violations. This included a Presidential Decree on 11 April 1992 that no activities in conflict with the BWC are permitted inside Russian territory. A variety of government agencies are presently involved in the regulation of activities related to disease-causing agents that infect humans, animals and plants. They include the ministries of Foreign Affairs, Health, Agriculture, Interior and Defence. A number of regulations set strict control over the export of human, animal and plant disease agents as well as dual use equipment, and new provisions have been added to the Russian Federation Criminal Code (RFCC) to outlaw BWC violations. Specifically, the RFCC criminalises the development, production, stockpiling, acquisition, sale and use of BW. It also prohibits the massive destruction of flora and fauna, and poisoning of the atmosphere or water resources. It is an offence to violate safety rules in the handling of biological agents, and to violate regulations set for combating animal diseases and plant pests. Depending on the gravity of offences, the RFCC mandates imprisonment or bans on activities as punishment.\textsuperscript{290}

When Japan ratified the BWC in 1982, the Japanese Diet enacted the BWC Implementing Law. Using the language of Article I and Article III (non-proliferation) of the Convention, the Law criminalises the development, production, stockpiling and transfer of BW.\textsuperscript{291} It also empowers relevant ministers to order persons to make compulsory reports regarding their activities to the extent necessary for preventing activities with biological agents that serve no peaceful purpose. The ministers so empowered include the Minister for Education and Science, the Minister for Health, Labour and Welfare, the Minister for Agriculture, Forestry and Fisheries, and the Minister for Economy, Trade and Industry.\textsuperscript{292} For the First Meeting of BWC member states, Japan contributed a working paper on measures for strengthening biosecurity. This involves preventing the unauthorised access to disease-causing micro-organisms and other infectious materials and toxins that could be used in the development and manufacture of BW.\textsuperscript{293}

It is important to note that most of the above countries have BWC-relevant laws which cover both deliberate and naturally-caused disease, and which span a variety of areas in a whole-of-government approach to disease
security. To have such laws in place is a vital step towards greater security against disease-based threats. However, the real value of such laws, in terms of regulating behaviour and deterring criminality, lies in their enforcement — the challenge for a state is to give practical effect to its legal will. Even the US, with its vast and comprehensive law enforcement resources, has thus far been unable to identify the perpetrators of the October 2001 anthrax attacks and bring them to justice.

C. Sharing Technology vs. Non-Proliferation

Article X of the BWC requires member states to ‘facilitate ... the fullest possible exchange of equipment, materials, and scientific and technological information’ for peaceful purposes and to ‘cooperate in contributing with other states ... to the further development or application of scientific discoveries in the field of bacteriology (biology) for prevention of disease, or for other peaceful purposes.’

As is the case with Article I, the language of Article X is such that the provision is subject to interpretations of intent, ie, ‘for peaceful purposes’. This creates a natural tension with Article III under which BWC member states undertake ‘not to transfer to any recipient whatsoever ... any of the agents, toxins, weapons, equipment or means of delivery specified in Article I’. The greatest element of international distrust on BW issues is that developed countries are afraid to share biotechnology with developing countries for fear that it will not be used ‘for peaceful purposes’. Herein lies the dilemma of how to achieve the Convention’s dual objectives of technology transfer and non-proliferation. This section explores the general issues at stake in contemplating the sharing of disease-relevant biotechnology and concludes with a discussion of how these issues are perceived by countries in Northeast Asia.

Export controls on dual use technology, materials and equipment are the primary means by which developed countries, through an organisation known as the Australia Group (AG), pursue BW (and CW) non-proliferation. Critics of export controls argue that they are discriminatory in their intent and ineffective in achieving non-proliferation. On the issue of discrimination, the AG has been criticised for undermining the CWC by maintaining its own ‘warning list’ (of chemicals not to be exported to certain countries), which differs from and extends the lists of chemicals in Schedules to the Convention. There are fears that this practice could extend to the BWC.294 On the issue of effectiveness, the experience of India’s and Pakistan’s nuclear tests shows that technology denial may delay but cannot stop the development of WMD by a determined state.
Advocates of export controls, however, generally do not pretend that these are an adequate response to BW proliferation. Rather, export controls are seen as an interim measure that buys time until a better approach emerges. Given the rapid spread of dual use technology throughout the world, Tucker observes that supply-side strategies can only slow down proliferation and are not a long-term solution to the problem. He proposes a stronger demand-side approach to non-proliferation emphasising, for example, building a non-proliferation culture in countries of concern by fostering exchanges and collaborative research between scientists from developed and developing countries. Tucker’s suggested approach, which correlates strongly with the spirit of Article X of the BWC, would require time and sustained political will before it could yield any non-proliferation benefit.

A number of authors emphasise how disarmament and development are inextricably linked, making Article X the crucial issue for the success of the BWC. Zanders proposes that a solution to the dilemma of sharing biotechnology lies in compromise from both sides. Developing countries with a greater interest in the non-security clauses of the Convention should, he argues, adopt policies of greater transparency in order to allay the security concerns of other parties. In turn, industrialised countries must recognise that their security would benefit from verification of their own BWC compliance and from the higher degree of universality that implementing Article X would bring to the Convention. Unfortunately, achieving a fundamental compromise such as this has proven extremely difficult politically. For over 30 years since the BWC was opened for signature, the question of how to implement Article X has been a largely intractable issue.

Nevertheless, it is possible that new security considerations could see a shift in non-proliferation policies which, by their very nature, tend to pit possessors of certain technologies against non-possessors. Biotechnology could become a special case because of disease-based threats that extend beyond the problem of BW. Emerging and re-emerging diseases of natural origin are a new security problem posing a direct threat to all societies in all parts of the world. Because of the role of biotechnology in addressing this threat, any future BWC regime would have huge implications for the security of states and individuals. It may be that economic assistance could be provided in a manner that satisfies the interests of both developed and developing countries. Smithson advocates, for example, the provision of aid to strengthen national and international capabilities to detect emerging diseases. This measure addresses Article X while also providing a much-needed boost for global systems to provide early warnings of disease outbreaks. It must be remembered that the primary and ongoing disease
security concern of most countries lies in controlling natural outbreaks and not in the possibility of a BW attack.200

Export controls on disease-relevant biotechnology and related equipment potentially hinder medical advancements in countries designated as being of BW proliferation concern. However, there are also other barriers to assisting developing countries dealing with naturally-occurring disease security threats. For example, international rules governing intellectual property arguably reduce the capacity of some developing countries to supply their people with affordable health care. In particular, the World Trade Organisation’s 1994 agreement on Trade-Related Aspects of Intellectual Property Rights affords 20 years of worldwide patent protection to technological inventions, including vaccines and medicines. Through patenting, a pharmaceutical company that develops a new drug enjoys a temporary global monopoly on all production, pricing and marketing of that patented drug.300

In early 2004, in the midst of the bird flu outbreak in East Asia, efforts to contain the virus were impeded by the contractual obligations of drug companies. The WHO had wanted to distribute a flu vaccine, manufactured for the 2004 southern hemisphere winter, in order to contain the disease at its epicentre in Vietnam. However, the two companies that manufacture the vaccine, Solvay and GlaxoSmithKline, were bound to supply it first to contracted customers in countries like Australia, such that there would be none left for Vietnam.301 At the other extreme, the control of drugs by pharmaceutical companies is tempered by an emerging practice of philanthropy and humanitarianism in the industry. For example, under a 2004 agreement with the WHO, Swiss company Novartis is to provide free anti-TB drugs to half a million people over the next five years.302 This illustrates the extent to which corporations as well as governments need to be engaged in facilitating the transfer of biotechnology to help developing countries fight disease.

The countries of Northeast Asia exhibit mixed attitudes to the issue of technology transfer versus non-proliferation. Japan, presently the world’s third largest investor in biotechnology R&D, believes firmly in non-proliferation through export controls and is a participant in the AG.303 In the spirit of Article X, however, it has provided official development assistance to developing countries bilaterally or through international organisations in fields including biotechnology. For example, Japan has organised seminars, offered training programs for researchers, and improved the research capabilities of institutions in such countries.304
South Korea, also an AG participant, has actively participated in international exchanges of scientific and technological information relating to the use of biological agents and toxins for peaceful purposes. It has also provided assistance to countries in need of advice on disease control and health issues generally. For example, the International Vaccine Institute, headquartered in Seoul, is an institution devoted to strengthening the capacity of developing countries in the development, production and use of vaccines in immunization programs. South Korea also sees itself as a potential recipient of the benefits flowing from technology sharing arrangements. In July 2003 the South Korean Health Ministry signed an agreement with the US Department of Health and Human Services to promote US-South Korea cooperation in vaccine-preventable and infectious disease research. The agreement called for expansion of collaboration in areas such as TB treatment, epidemic investigation and surveillance, BW terrorism and public health law. Specific actions agreed to included development of a joint working group to discuss public health emergency preparedness, exchanges of scientists and trainees, and other coordinated scientific research programs.

China attaches great importance to its development and progress in the biological field and has stated its desire for more co-operation and exchange among BWC member states in the peaceful use of biotechnology. Excluded from the AG, Beijing regards as discriminatory export control groups created by mainly Western countries that establish a monopoly on certain forms of technology. Such regimes, it argues, serve to deepen resentment among excluded countries and undermine international cooperation by using non-proliferation as a pretext. China believes the AG must be replaced by national export controls coordinated through mechanisms developed within the framework of a BWC verification regime.

A detailed statement by the Chinese Foreign Ministry in October 2002 appeared to show that China is sincere in this belief. The statement detailed: (1) China’s Regulations on Export Control of Dual-Use Biological Agents and Related Equipment and Technologies; and (2) its Dual-Use Biological Agents and Related Equipment and Technologies Export Control List. The Regulations, in force as of 1 December 2002, contain measures to strengthen export controls to prevent diversion of dual use biological agents, related equipment and technologies toward production of BW. Domestic measures include an export licensing system, licence application process, and criminal prosecution for violations. The Regulations also cover the receiving party and require guarantees that biological materials will not be diverted toward weapon production and unapproved third parties. The Export Control List
provides an extensive and well-defined list of human, animal and plant pathogens covered by the Regulations. It also covers dual use equipment such as containment facilities used to conduct research on dangerous microorganisms, protective equipment, fermentation units, and aerosol inhalation chambers.310

China sees itself as a provider as well as a potential receiver of biotechnology transfers and participates in many areas of international cooperation in this field. China's own scientific efforts in the area of disease control, for example, have shown some potential to benefit other countries. In January 2000, Chinese scientists became the first in the world to determine the genetic makeup of a fatal prawn disease, the leukodermal bacilliform virus, which for the previous few years had been responsible for a huge reduction in prawn production in Asia. Knowing the sequence of the virus's genome helped scientists develop diagnostic tools and therapeutic drugs. On the other hand, China's disastrous 2003 encounter with SARS showed it still requires assistance and expertise from outside. To this end, China has cooperative relations and projects with the WHO, the UN International Centre for Genetic Engineering and Biotechnology, and the Global Human Genome Project. In 1991, the China-European Community Biotechnology Centre was established in Beijing, and China and the US-based Rockefeller Foundation have collaborated in a research project on rice biotechnology.311

Russia believes peaceful scientific and technical cooperation in the areas of biology and biotechnology is an important way of strengthening the BWC. Many Russian agencies participate in the development and implementation of research programs, in collaboration with entities in other states, designed for solving public health, veterinary and agricultural problems. To exchange scientific achievements, Russia holds annual conferences on biotechnological problems, including work connected with pathogenic micro-organisms and toxins.312 Although not a participant in the AG, Russia has an extensive array of national export control measures that are largely similar to those of China.313

Taiwan has no official capacity to declare its attitude to Article X of the BWC, although it enjoys close collaboration with the US on a range of public health issues. It has also expressed a willingness to assist financially and technically in international health activities supported by the WHO.314 North Korea, while a member of the BWC, has at no stage expressed a view on Article X or participated constructively in negotiations to make the Convention work better.
3. Security Through Public Health: a Dual Use Response to Biological Weapons and Natural Plagues

The preceding two sections of this paper looked at addressing disease security concerns through military and intelligence responses, and through the BWC. This section explores the approach most likely to be successful against the dual threats of BW and naturally-occurring infectious disease outbreaks — a vigilant and high-capability public health approach. Security through public health calls for effective disease surveillance networks and strong health system capabilities. By directly addressing human vulnerability to infectious disease, it serves two important functions. Firstly, public health measures may lead potential BW perpetrators to suppose that the effects of an attack would be thwarted or at least reduced substantially. Secondly, they bolster defences against the threat of new and re-emerging infectious diseases of natural origin.

Security analysts too often assign BW to the family of WMD alongside CW and NW. However, preparation for defending against a BW attack has more in common with confronting the threat of emerging infectious diseases than preparation for a nuclear or chemical attack. In terms of likely consequences, there are many parallels between a natural outbreak of a deadly, contagious disease and a deliberate BW attack. In each scenario, disease outbreaks would be unannounced and would appear in otherwise healthy populations. The disease would spread, undetected, for some time before being identified and treated. It would then cause great confusion and raise questions about how to cope with an unfamiliar pathogen. In this context, it is more appropriate to regard BW less as ‘weapons’ but rather as one aspect of disease-based threats to security. Whether a disease outbreak is natural or deliberate, the public health arena is where the main security struggle would take place.

In some cases, natural disease could potentially give rise to deliberate disease. For example, samples of diseases endemic in the US (e.g., plague, tularaemia and anthrax) may be easier to access during a natural outbreak. There is reason to believe some terrorists might attempt to produce BW agents by acquiring a starter culture from natural sources. Aum Shinrikyo cult member Seiichi Endo reportedly obtained a sample of *Clostridium botulinum* bacteria from soil in a wilderness area of Hokkaido, Japan. And in October 1992, cult leader Shoko Asahara visited Zaire and attempted to obtain the Ebola virus during an outbreak there. For terrorists attempting to acquire microbe samples in this way, however, the technical challenge would be to choose a sufficiently pathogenic strain that was also able to be weaponised. Available
evidence indicates that Aum failed to make a weapon based on either botulinum toxin or Ebola.

In contemplating disease security, the fearful prospect of BW terrorism readily enters the imagination. Nevertheless, it is important not to over-emphasise this possibility. In public health planning efforts, if response preparation is too narrowly focused on a few select terrorism scenarios, the opportunity may be lost to plan responses to the broader spectrum of potential disease-related catastrophes. In the US, Brower and Chalk observe that considerable attention and resources are now directed to defence against a large-scale biological attack — a scenario they regard as unlikely. When it comes to the more commonly occurring and currently more taxing natural outbreaks of infectious disease, responses remain relatively under-funded.319

In a globalised world, the disease security of one country is potentially related to that of all other countries. Consequently, disease surveillance, control and eradication are bound to be inadequate without coordinated control between poor and rich countries. If only for the sake of their own security, developed countries need to assist developing countries with creating a strong public health infrastructure, educating local medical professionals, and implementing appropriate measures to enable timely identification and control of infectious diseases. Highly contagious diseases in particular are not hindered by political borders drawn on a map. As Prescott observes, 'pathogens of the developing world are becoming indistinguishable from those of the developed world.'320

A. Disease Surveillance Networks

Because a pathogenic microbe takes time to incubate inside a person's body, it may be days or weeks before the symptoms of an infectious disease are apparent. Post-infection detection of a serious outbreak happens when cases of disease are diagnosed simultaneously in multiple surgeries, clinics and hospitals. But without adequate networking and communication, nobody would know a disease outbreak was going on or the extent to which it had spread. Faced with new BW threats, as well as an increase in novel infectious diseases of natural origin, a strong case is being made for strengthening domestic and international systems for monitoring disease outbreaks in humans and, where relevant, in animals and plants.321 Diseases affecting the latter can have an adverse impact on human agricultural livelihoods and, as discussed previously, some animal diseases have the potential to become human ones.

During a massive urban BW attack, albeit an unlikely scenario, public health surveillance could be critical to minimising casualties and deaths. A
1997 study in the US examined expected deaths for scenarios involving three different BW agents (anthrax, tularemia and brucellosis) released in aerosol form over a major city. The timescales required for effective intervention vary according to the agent used. In the case of anthrax, the study found that intervention (ie, administration of antibiotics and vaccinations) within one day after the attack could keep deaths to below 10,000. If intervention occurred five or more days later, the number of deaths could be over 30,000. Clearly, timely and well-coordinated responses are vital for minimising the human cost of a large-scale disease event.

The effectiveness of disease surveillance is measured in terms of sensitivity and connectivity. ‘Sensitivity’ refers to the capability to identify quickly and accurately an illness that is out of the ordinary. ‘Connectivity’ refers to the speed and accuracy with which this and other relevant information gets passed among clinicians, public health entities and relevant international bodies. One way to become more sensitive to disease events is through syndromic disease surveillance. This method aims to detect atypical rises of illness in a community as early as possible. It involves monitoring indicators of illness (for example, certain types of emergency telephone calls, and sales of some over-the-counter medication) for increases in activity that would be abnormal for a given community at a particular time.

To achieve greater connectivity, the essence is communication. The US is a good example of how interagency cooperation at the national level might be improved. In the aftermath of the October 2001 anthrax attacks, protocols and procedures were devised to link up government agencies that previously would have had little to do with each other. In the interests of improved ‘bio-surveillance’ US state and federal officials from areas such as health and human services, homeland security, agriculture, environment, and the Food and Drug Administration (FDA) were brought together to prepare for BW terrorism and other public health emergencies. Beyond interagency cooperation, informal lines of two-way communication between government authorities and the public are also required. The purpose of this would be to help authorities track the movement of disease and to enable undue concerns to be addressed. Importantly, the right balance must be struck between transparency and security. On the one hand, there needs to be enough information available to reassure the public that they are safe against deliberate and natural disease events. On the other hand, it should not be easy for terrorists and others, informed along with everyone else of available emergency measures, to become aware of exploitable weaknesses in the public health system.
At the global level, using disease surveillance networks to ensure security is about improved communication between governments. The 2003 SARS outbreak yielded valuable but hard-learned lessons in this regard. China was roundly criticised for not advising the WHO sooner of a mystery virus that first appeared in its Guangdong province in November 2002. Beijing had also insisted on being the conduit for any requests from Taiwan to the WHO regarding the disease — this delayed crucial communications between Taipei and Geneva. The subsequent spread beyond China of what became known as SARS well illustrates the importance of communication for containment purposes. In May 2003, by which time the disease had proliferated beyond the control of any one nation, government leaders from the Association of Southeast Asian Nations (ASEAN) met in Bangkok to formulate a plan of strict control measures against SARS. The plan included compulsory pre-departure health checks at airports, ports, and all national borders across Southeast Asia, an emergency international hotline, and increased exchange of information and research. ASEAN health ministers also agreed to quarantine travellers that showed symptoms of the disease, and require all visitors from SARS-affected countries to have health declaration forms.

Rapid containment proved to be the key to defeating SARS in 2003. In addition to successful government cooperation, this achievement was in large part due to the effectiveness of the WHO’s Global Outbreak Alert and Response Network (GOARN) in detecting and responding to emerging infections of international public health importance. Under development since 1997, GOARN is a highly sensitive global disease surveillance system. It has created a network of over 100 laboratories and disease reporting systems, providing timely reports of infectious disease outbreaks by systematically scanning electronic resources, including web sites, news wires, public health email services and electronic discussion groups.

Other diseases, arising naturally or because of a BW attack, could pose greater challenges for disease surveillance. In October 2003, officials from eight nations (including Japan) belonging to the Global Health Security Group (GHSG) met to discuss the results of ‘Global Mercury’. This was an exercise involving a simulated smallpox attack in which self-infected, Asian-based terrorists flew commercially to North America and Europe. Passengers infected by the terrorists then travelled unwittingly to multiple cities. Significantly, WHO observers unexpectedly had to be called in to broker breakdowns in coordination among the eight participating nations. Each country differed greatly in its response to this hypothetical disease outbreak when it came to culture, language and priorities. With conflicting national
protocols undermining a swift response, the exercise underscored the drawbacks of defending against BW threats nation by nation.  

Global Mercury showed that a rapid response protocol for medical disasters was necessary to facilitate communication between officials in GHSG countries. The protocol would involve government officials alerting senior doctors nationwide to a disease outbreak by email and paper messages. Such a system could be used in response to BW events as well as naturally occurring diseases. Officials would likely not know the cause of disease was deliberate or natural until a full forensic and epidemiological investigation had been completed. Suspicions of BW use would immediately be aroused, for example, if the strain of infectious disease was different from that expected in a natural outbreak. In either scenario, the disease surveillance and public health response requirements would be largely identical.

When it comes to disease surveillance, there are potentially dangerous gaps in the way naturally-occurring infectious diseases are treated under international law. The WHO's present International Health Regulations (IHR) require states to notify the Organisation within 24 hours of outbreaks of cholera, yellow fever and plague. The Regulations operate only through persuasion and recommendation by the WHO, and they do not address other infectious diseases with the potential to spread internationally. Following discussions about SARS at the 56th World Health Assembly (WHA), the IHR are currently being revised. The scope of revised Regulations will be broadened beyond the existing three notifiable diseases to include public health emergencies of international concern. The new notification rules identify a set of criteria to assist states in deciding whether the WHO needs to know about a disease event. The criteria are: (1) is the event serious?; (2) is the event unexpected?; (3) is there a significant risk of international spread?; and (4) is there a significant risk of international restriction(s) to travel and trade? In addition, the WHA has passed a resolution authorising the WHO to draw on unofficial sources of information, if necessary, to verify infectious disease outbreaks. For example, informal internet discussion groups such as FluNet, ProMED and PACNET are often the first to identify a significant percentage of outbreaks.

Nevertheless, for the foreseeable future, any international response to potentially global disease threats will still have to rely on ad hoc multilateral cooperation and a WHO constrained by limited resources and authority. One suggested improvement is that governments be forced to comply with WHO demands for cooperation and that the Organisation be given verification 'teeth' akin to an arms control or disarmament regime.
However, the experience of the BWC, through which the punishment of suspected BW possession and use has proved impossible, suggests that negotiating and implementing an enforceable WHO disease security regime would be a daunting task. Even without formal enforcement powers, the WHO is presently capable of bringing international pressure to bear on uncooperative countries, as demonstrated by the recent SARS experience. China was not bound to alert the WHO of the outbreak occurring within its borders, but doing so enabled it to receive the domestic support and global awareness it so urgently needed to defeat the disease. This shows that there is an incentive for countries to release information to the public and world health authorities.\textsuperscript{339} On the disincentive side, WHO health alerts and travel advisories can have virtually the same effect as economic sanctions. Such a prospect, however, may also make countries reluctant to report disease outbreaks in the first place.\textsuperscript{340}

Instead of relying on a largely passive system of global disease vigilance, it may be that a more proactive approach is required to meet increasing disease security threats. At present, the burden of infectious disease is borne disproportionately by developing countries. However, as the emergence and re-emergence of diseases continue to accelerate, developed countries might have to start sharing that burden. Advanced countries like the US are well placed to take the lead in improving the global disease surveillance and response capacity. The WHO is already heavily dependent on the US for funding and for specialists that conduct international investigations of disease outbreaks. Now the case is being made for much more funding for the WHO and the creation of more WHO centres at the regional level.\textsuperscript{341} This would enable a more rapid and effective response to local disease outbreaks and would ensure existing WHO laboratories were not overwhelmed by requests to analyse samples. Instead of going it alone on security against infectious disease, it could be cheaper and more effective for the US to build global networks that could spot and contain outbreaks where they begin. The alternative is to react after the disease has already started spreading towards or within the American homeland.

Disease surveillance is a sound measure for minimising the effects of natural or deliberate disease outbreaks by stimulating timely responses. Once a disease has established itself to a greater or lesser extent, the next security challenge is a race against time to prevent as many human infections and deaths as possible. At this point, the response to a disease outbreak relies heavily on the capability of public health systems to diagnose, isolate and treat patients.
B. Public Health System Capabilities

In the context of rising disease threats, the defence of states and individuals could increasingly be rooted in the capabilities of a new player in the realm of security — the public health system. A strong system can quickly identify the occurrence of a deliberate or natural disease event, contain the number of patients, help restore calm to society, and ensure the health of the population. At present, however, hospitals around the world are stretched to the limit on day-to-day matters, with barely enough staff and equipment to deal with each year's influenza epidemic. For most if not all countries, strengthening public health capabilities beyond current levels would require considerable expense and the associated reordering of national policy priorities. In most developed countries, infectious diseases have been a relatively low priority for the past 30 years, partly because of a widespread confidence that technological advances could solve the challenges posed by pathogenic micro-organisms. As a result, many of today's medical professionals lack the education and training necessary to recognise and treat emerging and re-emerging diseases. Likewise, in the context of possible BW agents like anthrax or plague, few doctors outside the developing world would routinely be on the lookout for symptoms of such diseases.

Among security analysts, much of the discussion about how to respond to disease disasters is driven primarily by concerns about BW. Most public health measures that would avert or mitigate a BW attack would also be needed to protect populations against the increasing danger from infectious diseases of natural origin. Given this overlap in health security and national security needs, a number of authors advocate a dual use response as the best approach to BW. It is argued that, as the magnitude of the BW threat is so difficult to calculate, and the intention of potential attackers so hard to manage, it makes sense to focus on dual use remedies aimed at limiting vulnerability to disease generally. Pursuing medical countermeasures would improve public health regardless of whether major biological attacks ever occurred. For this reason, policy makers may find that medical responses to the BW threat are more politically saleable than other responses requiring comparable expenditure.

Enhancing public health system capabilities to meet the dual threat of deliberate and natural disease could involve, for example:

1. Augmenting the supply of available medical professionals. A relatively quick way to achieve this would be to create public health service reserves, akin to military reserves, to be called up in emergencies. Such a force
need only be trained for low-level duties such as administering drugs and vaccines.

2. Supporting public health education and training, particularly in the detection, identification, diagnosis and treatment of novel infectious diseases.

3. Developing emergency health plans at medical facilities to deal with sudden crises and influxes of patients. This means building in a surge capacity in terms of staff and hospital beds, and having in place back-up communication systems and power supplies.345

Building in extra public health capacity goes against the grain for governments intent on cost-cutting. But if the extra spending on disease protection could not be justified on public health grounds alone, perhaps it could be seen as worthwhile if conceived as a national security measure. In the US, the Bush Administration has announced Project Bioshield, intended to protect America from future BW threats. This project allocates around $US5.6 billion over 10 years to create a market for private companies to develop and sell to the government the necessary vaccines and drugs to treat Americans in the event of a BW attack.346 The Infectious Disease Society of America (IDSA) supports Project Bioshield but laments that it does nothing to address the threat of naturally occurring diseases. The IDSA has called for the creation of ‘Bioshield II’ to ‘spur the development of new antibacterial drugs to treat infectious disease-related public health threats that are not linked to bioterrorism’.347

Resisting emerging disease and biological attacks with drugs could eventually require a more forward-thinking approach than stockpiling vaccines for known illnesses. Influenza presents a particular challenge in this regard. In anticipation of the next global flu pandemic, some scientists have called for the stockpiling of antiviral drugs — something no country has yet done, even though effective drugs such as Relenza and Tamiflu are available.348 Epidemiological modelling suggests that influenza, being even more infectious than SARS, is unlikely to be controllable by SARS-like quarantine measures alone. Antiviral drugs would reduce the severity and spread of infection. In addition, a so-called ‘sub-type’ flu vaccine, while not preventing infection by a particular strain of the virus, could reduce the severity of illness until a precisely matching vaccine could be produced.349

Private companies that make drugs and vaccines do not, however, see any incentive in flu research. R&D for drugs to fight infectious diseases is extremely expensive. It can take up to 12 years and cost $US600 million after the discovery of a molecule with medicinal potential for it to be
developed as a new drug. And one-third of medicines on the market do not make enough money to cover their R&D costs. In an intensely competitive drug market, where more money is to be made producing medication to treat impotence and baldness, the opportunity costs of pursuing infectious disease treatments are too high for most pharmaceutical companies. Following the US example, other governments might have to generate demand for production where the market does not.

Public health capabilities matter not only at home, but also inside the countries from which future disease security threats may come. Because infectious diseases can move rapidly across the globe, especially if they are highly contagious, developed countries that do not currently bear a heavy disease burden have an interest in keeping things that way. For the US, protecting its population against disease threats may require measures that extend beyond homeland security considerations. To pre-empt the spread of deadly disease to America’s own territory, Brower and Chalk advocate increased US aid to foreign governments to help them increase the effectiveness of their internal disease prevention efforts. They recommend initiatives such as:

- agreements to share biological intelligence, research, diagnostics, personnel, vaccines, antibiotics, medical equipment and disease prevention or treatment techniques;
- assistance to create dedicated health surveillance networks; and
- help to promote sustainable urban development and regeneration of cities.

In some cases, even if the political will to improve global disease surveillance and prevention could be found, it would still be difficult to gain physical access to regions, such as the Congo or southern Sudan, that are continuously in the grip of civil conflict. And yet these sub-Saharan areas are infectious disease ‘hot spots’ where outbreaks are highly likely and where the monitoring and containment of illness is most important. Southern China too is especially prone to disease outbreaks, as witnessed by the recent experiences of SARS and bird flu. Here, gaining physical access for physicians and epidemiologists would be less of a problem than in strife torn regions of Africa. And China, having been badly hurt by uncontained disease outbreaks in the recent past, has probably become more receptive to offers of outside help.

Such assistance need not be one-way, however. Medical professionals in poorer countries would generally have more experience dealing with
infectious diseases than those in the West; thus, the sharing of expertise could potentially be of mutual benefit.

C. Northeast Asia

The following table provides an indication of public health system capabilities across Northeast Asia:

<table>
<thead>
<tr>
<th>Country</th>
<th>Population</th>
<th>Total Health Expenditure (% of GDP)</th>
<th>Physicians, rate per 100,000/year</th>
<th>Nurses, rate per 100,000/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>1,292,378,000</td>
<td>5.3</td>
<td>161.7/1998</td>
<td>98.6/1998</td>
</tr>
<tr>
<td>Japan</td>
<td>127,334,000</td>
<td>7.8</td>
<td>193.2/1996</td>
<td>744.9/1996</td>
</tr>
<tr>
<td>North Korea</td>
<td>22,427,000</td>
<td>2.1</td>
<td>297.0/1995</td>
<td>180.0/1995</td>
</tr>
<tr>
<td>Russia</td>
<td>144,663,000</td>
<td>5.3</td>
<td>421.0/1998</td>
<td>821.0/1998</td>
</tr>
<tr>
<td>South Korea</td>
<td>47,068,000</td>
<td>6.0</td>
<td>136.1/1997</td>
<td>291.2/1997</td>
</tr>
<tr>
<td>Taiwan</td>
<td>22,260,000</td>
<td>5.4</td>
<td>181.0/1999</td>
<td>345.0/1999</td>
</tr>
</tbody>
</table>

These figures indicate varying degrees of resource allocation by countries within the region, and roughly suggest how well each is positioned to respond to a disease emergency. The numerical data presented above comes with the caveat that the skill levels of local medical staff would vary as between the developed and developing countries that make up the region. While figures such as the number of doctors per capita are the normal measures for a country's health status, there may also be social factors peculiar to a country that have an impact on vulnerability to illness. In Russia, for example, the average person consumes 11 to 14.5 litres of pure alcohol per year. The immune system suppression caused by this extraordinary alcohol consumption makes Russians more vulnerable to infectious diseases.

Recent efforts by Northeast Asian countries towards increased disease security have been prompted by fresh fears of BW terrorism and, to a greater extent, by the experience of SARS in 2003. Japan, for example, developed a Basic Policy on Responding to Biological and Chemical Terrorism following the US anthrax attacks of October 2001. The Policy involves reinforcement
of the health care system (anti-infectious disease measures and vaccine stockpiling), closer government cooperation with health and related institutions, and improved management of biological materials that might be used by terrorists. Efforts have also been directed to creating manuals for first responders, improving the diagnostic capability of testing laboratories, establishing and training special units in local police forces, and enhancing the capacity of the Self-Defence Force to address biological terrorist attacks. Regarding the latter, an earlier section of this paper discussed the problems of responding to disease threats with military means.

SARS, however, has been the greatest stimulus for increased resource allocation and health policy rethinks in the region. An example is Hong Kong which, having learned the importance of containing a highly contagious disease, spent $HK400 million putting 1,280 isolation beds in nine public hospitals, and $HK100 million retraining medical staff. By contrast, Taiwan’s SARS experience suggests that having abundant public health resources may not necessarily be helpful. The Taiwanese government-run National Health Insurance system, established in 1995, provides nearly universal health care, with 96 per cent of the island’s population insured. Government funding has gradually led to a massive increase in the number of hospital beds and doctors. However, such a system had drawbacks that may have exacerbated the spread of SARS in 2003. In particular, the ease and low cost of visiting hospitals meant large numbers of people could move though emergency rooms and outpatient wards, making it harder to control the spread of infection. And patients unsatisfied with the treatment at one hospital, or who wanted a second opinion, could simply go to another hospital and carry the disease there with them. Taiwan’s Health Department is now drawing up plans to increase the price burden to individuals, in the hope that this will make people more conscious of frivolous use of the public health system.

Given the disparity in public health resources available to different countries in Northeast Asia, there is no single model for how disease security should be addressed across the region. In any event, the most important lessons in responding to disease-based threats are likely to be learned first at the national level. Thereafter, the challenge for governments is to cooperate with each other once a national threat acquires transnational dimensions. A case study of China – the largest country in Northeast Asia – reveals some of the disease security issues that potentially face national governments.
4. The Case of China

The concept of disease security has special importance for China. Although labelled by the US as a country of BW concern, China also recognises its vulnerability to deliberate disease. More pressing than the prospect of a BW attack, however, is China’s constant battle with infectious diseases of natural origin. These diseases become a security threat when their effects reach the point of imposing an intolerable burden on Chinese society. In disease security terms, that burden is measurable by the number of people infected and killed, and by the level of disruption and instability that accompanies the disease. AIDS and TB are gradually sapping the health and lives of an increasing number of Chinese and, in the last two years alone, SARS and bird flu have in turn taken a great toll. When illness brings instability and death brings disruption, so the disease security of the Chinese state and its people is undermined.

To a far greater extent than Western countries, China (even as a potential global power) has deep security concerns grounded in ensuring the internal stability of the state, preserving social cohesion, and feeding its people.359 A further element of legitimacy for the ruling Chinese Communist Party (CCP) is economic performance and the achievement of ‘xiaokang’ — a well-off society.360 China’s recent accession to the World Trade Organisation, bringing increased competition to a vulnerable market, will likely intensify the challenge of maintaining growth and social stability. In this delicate context of nation-building, the social disruption that comes with infectious disease has serious implications for security.

China has a long tradition of fighting infectious disease. A century before the English physician Edward Jenner conducted his experiments into smallpox vaccination in 1796, Chinese physicians were already engaged in a crude form of this practice. Fleas taken from cows were compacted into tablets and swallowed. The fleas had ingested tiny amounts of blood containing cowpox, a close relative of smallpox, such that swallowing the tablets offered vaccine protection.361 Communist China has regarded population health as a national security issue since the earliest days of its existence. In 1952, amidst the controversy over alleged US use of BW in the Korean War, CCP Chairman Mao Zedong launched China’s first Patriotic Hygiene Campaign. The slogan for the campaign was: ‘Mobilise to promote hygiene, to reduce disease, to raise the level of the people’s health, and to smash the germ warfare of the American imperialists!’362 Today, disease security issues facing China revolve around the international politics of BW disarmament, China’s special vulnerability to infectious diseases, and the current state of its health care system.
A. Policy on BW Disarmament

China's policy on BW disarmament needs to be understood, firstly, in the historical context of its own experience as a victim of biological warfare. More broadly, it is determined by China's fundamental interests — most importantly, its need for a peaceful and stable international environment that allows it to concentrate on economic growth.\textsuperscript{363}

Arguably, China is better placed than most countries to have an aversion to deliberate disease. Its twentieth century experiences of BW have made a profound impression on the way China perceives security and remain part of the lives of ordinary Chinese. In 1997, 180 Chinese civilians brought a civil action against the Japanese Government for atrocities committed by Unit 731. They sought an official apology and 10 million yen in compensation for each plaintiff.\textsuperscript{364} In August 2002 the Tokyo District Court dismissed the claim for compensation, although it did admit that Japan had engaged in biological warfare in China during World War Two and caused harm.\textsuperscript{365} In BWC negotiations, China has sought to assure other countries that, having been the victim of BW, it is in favour of their complete prohibition.\textsuperscript{366}

China is a heavily populated country compelled to pursue peaceful uses of new technologies on a large scale to achieve its economic goals. China's general goal in developing biotechnology is to address important problems in the areas of food production, medical treatment (developing new drugs and vaccines), health care, energy, resources (increasing livestock production and crop output) and the environment. Biotechnology is seen as vital for using recycled resources fully and effectively, meeting the needs of a growing population, and improving nutritional standards.\textsuperscript{367} China has made some good progress in the area of infectious diseases. For example, it has successfully completed work on new treatments for hepatitis B and a genetically engineered vaccine against dysentery. However, China trails behind more industrialised countries in the area of antibiotics production based on micro-organism fermentation.\textsuperscript{368} Efforts to improve this area of biotechnology attract the greatest concern outside China because of their potential to be directed towards BW programs.

China has been keen to alleviate such concerns. In December 2003 the Chinese Ministry of Foreign Affairs released a document detailing China's methods of preventing WMD from falling into the wrong hands. This document apparently sought to reassure the international community that China is not exporting missile and WMD-related technology and has mechanisms in place to prevent such exports. Importantly, China pointed out that, having moved away from a planned economy towards a socialist
market economy, its non-proliferation system has had to change from administrative controls on exports to law-based controls. This means relying less on administering government-owned companies and more on laws instituted recently to govern the activities of private companies. Outside its own jurisdiction, China has always been an active participant in negotiations to improve the BWC. In the 1980s, China supported the development and implementation of confidence-building measures in the form of information exchanges between BWC member states. Since 1987, it has reported annually to the UN on BWC-related information in accordance with the decisions of BWC Review Conferences. And China participated actively in the negotiations commenced in 1995 for a BWC verification protocol.

In spite of this apparent record of good faith on BW issues, China remains a BW suspect in the eyes of the US and most Western countries. This problem is not likely to be overcome until the CCP is able to govern with greater transparency. Even so, there may be some hypocrisy in the demand by Western countries that developing countries be more open about their biotechnology activities. One of the principal objections of the US to a BWC verification regime was that it would expose the activities of American pharmaceutical companies to greater scrutiny. At the Fifth Review Conference of the BWC in 2001, China criticised those countries which lecture others on BWC obligations while remaining silent about their own relevant activities and facilities. The leader of the Chinese delegation made the analogy that 'this is like a man with a flashlight in hand only to cast light on others while he himself stays in the dark.'

From China’s perspective as a developing country, a BW disarmament regime has significant implications regarding the use of biotechnology for peaceful purposes. This is especially so in the context of navigating through the dual requirements of non-proliferation and technology sharing under the BWC. The challenge for China is to pursue advancements in biotechnology without causing others to suspect that it is using that technology to conduct a BW program. Chinese research into infectious diseases is a particularly delicate area because of its potential offensive applications. However, there is good reason to expect that such research would most likely be benign in nature. Questions of BW aside, China faces a clear security threat in the form of naturally occurring infectious diseases.

B. Vulnerability to Infectious Disease

China is home to one-fifth of the world’s population and incurs one-seventh of the world’s disease burden, measured in lost years of healthy
life. In 2000 the Chinese Ministry of Health sponsored an epidemiological sampling survey of pulmonary TB. The survey found that 400 million Chinese, or 31 per cent of the population, were infected with TB, which leads to around 150,000 deaths each year.\textsuperscript{373} By 2010, the number of people in China with HIV/AIDS is forecast to reach 10 million.\textsuperscript{374} AIDS and TB are established in the Chinese population, so they are readily subject to public health forecasting. Far greater uncertainty surrounds the future effects of fast-spreading diseases that have beset China recently. Reports of avian influenza have increased sharply since 2001 and SARS, which had receded by August 2003, began to show itself again in early 2004.\textsuperscript{375}

Fears of a SARS or new influenza pandemic have made southern China a special focus of attention by public health analysts. As discussed in Part II, poor hygiene and overcrowding, and the practice of farmers living in close proximity with their livestock, mean the area is especially prone to microbes making zoonotic jumps from animals to humans. Another aspect of China’s special vulnerability to disease is rapid urbanisation, which is expanding the traditional role of cities as gateways for infections. China plans to increase its urban population from 37 per cent to 50 per cent by 2020.\textsuperscript{376} Moreover, China has a floating population of around 100 million surplus labourers who are constantly on the move in search of a better living. Internal migration on such a large scale has the potential to spark major epidemics as migrants introduce infectious diseases into new populations. With the influx of poor migrants into China’s main cities come overcrowding and sanitation problems, thus exacerbating the risk of disease transmission even further.\textsuperscript{377}

The problem of infectious disease in China is an important internal security consideration, but it also has potential relevance internationally. Diseases originating in China can quickly achieve global reach through trade, travel and population movements. For example, New York City, which has one of the largest communities of Chinese immigrants in the US, also has the country’s highest rate of TB.\textsuperscript{378} Within nine months of the emergence of SARS in China’s Guangdong province, the disease had spread to 30 countries around the world.\textsuperscript{379}

In the face of disease security problems affecting China and originating inside its borders, a strong public health response is needed. Research into infectious diseases, while it may stimulate outside concerns about BW, is but one important measure. Another is to improve some of the procedural and physical features of China’s vast health care system.
C. Health Care System

Beyond environmental and demographic considerations, China's special vulnerability to infectious disease is accentuated by the shortcomings of its health care system. With its population becoming increasingly urbanised, China launched an ambitious program in 1998 to reform urban health care. It has made great progress since then, with a new policy designed to broaden insurance coverage, contain runaway health care costs, and improve the quality of health services.\(^\text{380}\) According to Huang, however, market-oriented health care reforms have served only to worsen China's health system and exacerbate problems of quality, cost, access and equality.\(^\text{381}\) In this context, it is important to remember that, in a sense, there is not one China but many. China's health care system, the largest in the world, serves a population characterised by huge disparities in wealth. Each of China's mainland provinces (including municipalities, autonomous regions and special administrative regions) is like a separate country — many are larger than most European countries. There are wealthy, highly developed provinces like Shanghai, as well as poor ones like Guangxi (bordering Vietnam) that resemble developing countries.\(^\text{382}\)

The average cost of staying at a state-run hospital in Beijing is almost $US1400, equal to half the annual salary of a typical city resident. In rural areas, home to 700 million Chinese, the situation is much worse. Most have no insurance, and medical costs have risen faster than farmers' incomes. Much of what the people can pay goes to unlicensed and unqualified medical practitioners, or on unnecessary or inappropriate drugs sold by clinics whose funding relies on pharmaceutical sales.\(^\text{383}\) Under a system in which local doctors act on a fee-for-service basis, they have had little incentive to visit remote villages to vaccinate children, preferring instead to concentrate on more lucrative work in the main towns and cities. Partly as a result of this, preventive health measures such as immunization have been ignored in many areas, leading to the resurgence of infectious diseases.\(^\text{384}\)

On available evidence, SARS appears not to have spread outside the major cities of China. Had it done so, the impact could have been disastrous. After 20 years of uneven economic development, China's less developed regions have far fewer hospitals, medical professionals and medicines, and have less sanitation than the cities.\(^\text{385}\) According to Huang, the inadequacies of China's public health system compromised the 2003 battle against SARS in three crucial respects:

1. lack of state funding — underfinanced local government health care systems did not have adequate resources to carry out SARS prevention and treatment;
2. lack of staff and facilities — among the 66,000 health care workers in Beijing, less than 3,000 were familiar with respiratory diseases; and

3. inequalities in health resource distribution — the millions of peasant workers fleeing the cities to escape SARS threatened to spark a large scale epidemic in rural areas where the health infrastructure is severely strained.\textsuperscript{386}

Despite these structural handicaps, China nevertheless showed itself to be quite resourceful at an operational level. Containment of the epidemic was facilitated by rapid training of medical staff in the use of protective equipment, the creation of fever clinics, and improvements to patient management. Added to this effort, the Chinese government was able to supply 11 million surgical masks, gowns and gloves, and to distribute quickly 300 tonnes of disinfectant. And after overcoming its initial reticence about publicly declaring the existence of SARS, the government launched a massive media effort to alert its population to the risks of the disease.\textsuperscript{387} In the aftermath of the 2003 SARS outbreak, change may be on the way in China. Beijing has since announced $US1.3 billion in new funding to the national health system for SARS prevention and building quarantine facilities. Upgrading China’s health system will also require vital investment in a variety of other fields including disease surveillance, epidemiology, and training in disease control.\textsuperscript{388}

Disease outbreaks are and have been very costly for the Chinese economy, and the Chinese government has an interest in making public health investments to minimise the chances of future setbacks to its pursuit of economic growth. However, the problems of inadequate health care in China are not just an economic issue. Increasingly, they have become a political issue that could jeopardise the stability of the CCP regime.\textsuperscript{389} For example, faced with a failing national health system, millions of Chinese have been attracted to Falun Gong, a philosophy/movement drawing on traditional ‘qigong’ exercises that are said to stimulate supernatural forces to achieve good health.\textsuperscript{390} This movement has also come to challenge Beijing as an alternative locus of political power in China.

The combined effects of AIDS, TB and fast-spreading diseases like SARS and influenza promise to add ever-increasing pressure to China’s vast yet inadequate health care system. The consequences of an infectious disease out of control in China would potentially be felt globally, such that the rest of the world has a disease security interest in the strength of Chinese public health capabilities. Huang argues that the US, for example, should greatly increase the level of health assistance it provides to China. New forms of aid could include:
expanded cooperation with China to fight HIV through improved health infrastructure, training for medical personnel, prevention programs, and greater access to medicine;

- assistance to expand vaccine coverage through the purchase and improved delivery of new vaccines;

- advice on regulatory oversight delivered through training or exchange programs between the FDA and China’s State Drug Administration Bureau; and

- encouragement of Chinese non-government organisations and community-based groups that agitate to improve public health in China.397

Just as infectious diseases do not discriminate between individuals, they traverse the globe without regard for national borders. As Huang’s idea of deploying the resources of one country so far afield demonstrates, the pursuit of disease security often requires a matching transnational approach.

An important final point is that an enhanced public health system in China would yield added protection also against the threat of BW. Depending on the nature of the BW agent used, and the method used to deliver it, it might be difficult to know with certainty whether a disease event was natural or not. But regardless of an outbreak’s origin, disease security in China would depend mainly upon effective disease surveillance and strong public health system capabilities.
CONCLUSION

In Northeast Asia and around the world, new infectious diseases are emerging and old ones are re-emerging in deadlier guises. The increasing human cost of such diseases creates an imperative for scholars and policy makers to think beyond BW when contemplating disease and security. Whether deliberately or naturally caused, infectious diseases threaten the national security of states, the personal security of individuals, and are potentially a transnational security threat to all individuals in all societies. At the conceptual level, and for the purpose of responding to these threats, it is useful to think in terms of ‘disease security’.

An infectious disease, whether of state, terrorist or natural origin, becomes a security threat when its effects reach the point of imposing an intolerable burden on a society. That burden can be measured in terms of the number of people infected and killed, and by the level of disruption and instability that accompanies the disease. The purpose of this paper has been to demonstrate the utility of examining disease in two dimensions, natural and deliberate, and of adopting dual use responses accordingly. Northeast Asia was chosen as a case study because it is a centre of gravity for concerns about disease security. This is due to the region’s military history, its high proportion of suspected BW states, fears of biological terrorism, and the region’s special vulnerability to new and re-emerging infectious diseases.

Northeast Asia bears the historical legacy of Japan’s use of BW in China before and during World War Two. This had a devastating effect at the time and continues to be a part of BW politics in the region today. That the US used BW during the Korean War is highly doubtful, but the controversy continues to simmer. Today, there are numerous incentives and disincentives for countries to acquire BW. These relate largely to calculations of their military value, measured in terms of the battlefield utility of BW and their strategic deterrent effect. In neither respect do BW have a proven track record, but they continue to have appeal for some countries. This is largely due to the low cost of a BW capability relative to other WMD, and to the great psychological impact that disease has on humans. Compared to other parts of the world, the Northeast Asian region has a high proportion of suspected BW states. Although the US and other Western countries suspect North Korea, Russia, China and Taiwan of possessing BW, it is impossible to find conclusive evidence of this on the public record. Determining the BW status of any country is seldom an easy task. The 2003 Iraq War showed the difficulties in proving the existence of Iraqi BW both before and after the
US-led invasion. And there is potential for defensive BW programs, such as that run by the US, to be mistaken as having an offensive purpose.

Beyond concerns about state-run BW programs, another threat facing Northeast Asia is biological terrorism. Although it might be analytically convenient to assume the worst regarding terrorists, what little history there is of BW terrorism suggests that mass casualties are an unlikely prospect at present. Successful biological terrorism requires perpetrators to have a precise configuration of motivation and capability. On the basis of conceptual and empirical analysis, the characteristics of the most likely candidates for BW terrorism are: a religious motivation; an apocalyptic worldview envisaging disease as a heavenly punishment; a high degree of relevant scientific expertise; and large financial resources. At present, no known terrorist group possesses a matching configuration of attributes. Aum Shinrikyo came close, but its BW efforts were ultimately a failure.

The second limb of disease security concerns emerging and re-emerging infectious diseases of natural origin. Northeast Asia is particularly prone to outbreaks of such diseases, largely due to environmental circumstances, farming practices and inadequate public health resources. The history of disease shows that human activity and interaction with animals have been the prime factors in the movement and mutation of micro-organisms over time. Globalisation and population increases have led humans to inhabit and develop previously unoccupied environments where they have encountered hitherto unknown micro-organisms. In the case of some familiar bacterial diseases, the widespread misuse of antibiotics has gradually made germs more resistant to medical treatment.

Different diseases have different security implications, largely depending on the extent to which they are easily transmitted from human to human. Two recently-emerged diseases are the subject of particular security concern in Northeast Asia: AIDS, slow-moving and long-incubating, for the sheer enormity of the disease burden it creates; and SARS, unfamiliar and fast-spreading, for the panic and disruption it causes.

A number of measures have been and could be applied in Northeast Asia to enhance disease security. Against the threat of BW, military and intelligence responses include tactical response units, deterrence of BW use by threat of nuclear attack, the use of force to destroy BW assets, and the recently-devised PSI. On the whole, responding to BW threats by military means does not appear very promising, and intelligence agencies face a myriad of technical obstacles in locating and assessing BW threats. There is, however, scope for pursuing disease security generally through
cooperation between officials from the intelligence and public health spheres. Disease surveillance information, for example, could be important in determining whether a disease outbreak was naturally or deliberately caused.

The BWC, although not a verifiable disarmament treaty, also offers scope to address BW and other disease security issues. Although the regional security dynamics of Northeast Asia do not appear broadly favourable in a BWC context, the Convention is about more than just BW disarmament. Some of its provisions provide scope for enhancing disease security generally within the region. In accordance with Article IV, most countries in Northeast Asia have enacted BWC-relevant laws which cover both deliberate and naturally-caused disease, and which span a variety of areas in a whole-of-government approach to disease security.

Of great significance to dealing with both BW and infectious diseases generally via the BWC is the vexed issue of non-proliferation versus the transfer of technology. The greatest element of international distrust on BW issues is that developed countries are afraid to share biotechnology with developing countries for fear that it will not be used for peaceful purposes. Developed countries prefer to pursue security and non-proliferation through export controls, yet this has the capacity to aggravate international tensions. Developing countries see access to medical and biological technology as vital for the survival of their populations, yet the unregulated transfer of some aspects of biotechnology to irresponsible regimes could make BW use more likely. In facing a future of new and re-emerging infectious diseases of natural origin, the challenge for the BWC is to protect population health without facilitating the abuse of knowledge about human vulnerability to disease.

The most promising approach to disease security is through enhanced public health capabilities. This is essentially a dual use response applicable to both BW and naturally occurring outbreaks of infectious disease. Its two main pillars are disease surveillance networks (domestic and international) and robust public health systems. Achieving greater sensitivity and connectivity in disease surveillance calls for increased inter-agency cooperation within and between governments, more funding and resources for the WHO and other relevant bodies, as well as good communication between authorities and the general public.

For disease security purposes, countries increasingly have an interest not only in the strength of their own public health capabilities but also in that of other countries. Infectious diseases may originate within sovereign
borders but their effects can be felt globally. The recent, unprecedented appearance of monkeypox and West Nile virus inside the US suggests strongly that developed countries have a national security interest in hunting down exotic diseases before they spread from their place of origin. A ‘pre-emptive strike’ against infectious diseases means equipping developing countries with disease surveillance mechanisms, training local health professionals, and providing assistance to bolster their public health infrastructure. Domestically, public health systems need to become key players in the realm of national security. An important measure for national governments would be to provide hospitals with a surge capacity to ensure that, once a dangerous infectious disease is identified, there is room and resources to cope with the short-term increase in patient load.

The case of China illustrates the interplay between various aspects of disease security. One challenge for China is to pursue advancements in biotechnology, including important research on endemic infectious diseases, without causing others to suspect that it is using that technology to conduct a BW program. Another is to bring economic reforms to China’s vast health system without exacerbating the vulnerability of many Chinese to infectious diseases. Each of these challenges has important implications for the security of both the state and its people. China’s disease security is also relevant to the rest of world – the 2003 SARS outbreak demonstrated how quickly a local outbreak inside China could become a global threat.

Globalisation, international travel and the phenomenon of contagion make infectious diseases a transnational problem. Responses to that threat, primarily in the area of public health, will accordingly need to be undertaken both at a domestic and international level. But measures such as enhancing disease surveillance and providing hospitals with surge capacity might well be resisted by governments intent on cutting costs in the health sector. The pursuit of disease security through public health would require significant reallocations of resources and sustained political will. It may be unrealistic to expect national public health agencies to allocate resources to improve emergency preparedness from within their existing budgets. A BW attack might never happen, whereas hospitals face life-threatening illnesses of natural origin on a day-to-day basis. Similarly, the threat of emerging and re-emerging diseases, although more predictable than a BW attack, is for many countries not as obvious and immediate a threat as heart disease and cancer.

The threat of BW alone probably cannot win policy priority and added resources, and nor can that of naturally occurring infectious disease. The first is too expensive a commitment for a security threat that might never
materialise and whose credibility is contestable, and the second could continue to be seen purely as a health issue. In combination, however, the threats of deliberate and natural disease create a dual imperative for governments and other relevant entities to improve public health capabilities:

1. expenditure on security grounds to resist BW is more justifiable financially because it promises also to improve defences against natural diseases; and

2. expenditure on health grounds to resist natural diseases is made more acceptable politically because its dual use applicability to BW adds a security element.

In conclusion, it remains a worthwhile security measure to direct financial and intellectual resources towards defending against a BW attack. However, responses to deliberate disease cannot reasonably be separated from responses to disease threats of natural origin. When contemplating disease within the discipline of security studies, the focus of scholarly analysis and policy making must expand beyond BW issues alone. Infectious pathogens, whatever their origin, can exact a great human toll and impose a costly and destabilising burden on states. Such is the realm of concern for disease security.
Notes

Introduction


4 See Peterson, ‘Epidemic Disease and National Security’, p46.


8 Peterson, ‘Epidemic Disease and National Security’, p70.

9 Moodie, Reducing the Biological Threat, p42.


11 Shannon Selin, ‘The Security Implications of SARS’, CANCAPS Bulletin, no. 37, May 2003: p10. Without their own medical units, the Canadian forces would have been a burden to other allied units in Afghanistan.


13 Moodie, Reducing the Biological Threat, p27.


15 Brower and Chalk, The Global Threat of New and Reemerging Infectious Diseases, p7.


17 At the time of writing, in February 2004, there were indications that SARS might be resurfacing.

Part I: Biological Weapons

Monterey Institute of International Studies, Centre for Non-Proliferation Studies, 'Chemical and Biological Weapons: Possession and Programs Past and Present', <http://cns.miis.edu/research/cbw/possess.htm> (4 November 2003)


Mangold and Goldberg, Plague Wars, p16.

Croddy, Chemical and Biological Warfare, p225.

Mangold and Goldberg, Plague Wars, p21.

Croddy, Chemical and Biological Warfare, p225.

Croddy, Chemical and Biological Warfare, p225.


Croddy, Chemical and Biological Warfare, p225.


Endicott and Hagerman, The United States and Biological Warfare, p41.

Alibek, Biohazard, p37.

Endicott and Hagerman, The United States and Biological Warfare, p39.

Williams and Wallace, Unit 731, p301.


Mangold and Goldberg, Plague Wars, p28.

Alibek, Biological Weapons Activities, p28.


Endicott and Hagerman, The United States and Biological Warfare, p.x

Endicott and Hagerman, The United States and Biological Warfare, p186.


Endicott and Hagerman, The United States and Biological Warfare, pp2-3.


Endicott and Hagerman, The United States and Biological Warfare, p188.

Endicott and Hagerman, The United States and Biological Warfare, p195.

Endicott and Hagerman, The United States and Biological Warfare, p195.

Leitenberg, Cold War International History Project Bulletin, p187.

Leitenberg, Cold War International History Project Bulletin, p185.


Weathersby, Cold War International History Project Bulletin, p176.


Tucker, ‘Motivations For and Against Proliferation’, pp34-35.

Tucker, ‘Motivations For and Against Proliferation’, pp32-33.

pp65-66. Regarding the onset of disease, it is important to note that biological toxins (non-living, 'natural' chemical agents) have a more rapid effect than bacterial or viral agents and might be preferred over the relative slowness of live pathogens where a speedy result was required: see Malcolm Dando, The New Biological Weapons: Threat, Proliferation and Control, Boulder: Lynne Rienner, 2001: p19. For the purposes of this paper, toxins are not included in considerations of disease security. They are more appropriately regarded as biologically-derived chemical weapons: see Christopher F. Chyba, Biological Terrorism, Emerging Diseases, and National Security, New York: Rockefeller Brothers Fund, 1998: p7.

64 Martin, 'The Role of Biological Weapons in International Politics', p74. See also Tucker, 'Motivations For and Against Proliferation', p32.
65 Martin, 'The Role of Biological Weapons in International Politics', pp74-75.
66 See Moodie, Reducing the Biological Threat, p21.
67 Tucker, 'Motivations For and Against Proliferation', pp29-30.
69 Martin, 'The Role of Biological Weapons in International Politics', pp64, 80.
70 Martin, 'The Role of Biological Weapons in International Politics', pp81, 86.
71 Tucker, 'Motivations For and Against Proliferation', p31.
72 See Tucker, 'Motivations For and Against Proliferation', p34.
73 Martin, 'The Role of Biological Weapons in International Politics', p72. US intelligence suggests the Soviet Union may have tried to address the problem of keeping micro-organisms alive inside warheads by attaching refrigerator units to its ballistic missiles: Mangold and Goldberg, Plague Wars, pp84, 96. See also OTA, Proliferation of Weapons of Mass Destruction, p52.
75 A notable exception is Israel whose nuclear capability, while undeclared and untested, acts as a deterrent against attacks from neighbouring states.
76 OTA, Technologies Underlying Weapons of Mass Destruction, p83.
78 Klintworth, 'Northeast Asia', pp6-7.
80. Croddy, Chemical and Biological Warfare, p53; Cordesman, Weapons of Mass Destruction and North Korea, p5.
82. Alibek, Biohazard, p273.
85. Croddy, Chemical and Biological Warfare, p53; see also Mauroni, Chemical and Biological Warfare, p63.
88. Bermudez, Shield of the Great Leader, p150.
89. Bermudez, Shield of the Great Leader, pp80-81.
90. Bermudez, Shield of the Great Leader, p234.
91. Nuclear Threat Initiative, ‘Russia Overview’<http://www.nti.org/e_research/e1_russia_1.html> (4 November 2003); Monterey Institute, ‘Chemical and Biological Weapons’.
93. Monterey Institute, ‘Chemical and Biological Weapons’; Nuclear Threat Initiative, ‘Russia Overview’.
Braden University, Department of Peace Studies, ‘Declarations and Reservations to the Biological and Toxin Weapons Convention’


Mauroni, *Chemical and Biological Warfare*, p64.


Federation of American Scientists, ‘Taiwan Biological Weapons’

Monterey Institute, ‘Chemical and Biological Weapons’; Nuclear Threat Initiative, ‘Taiwan Overview’ <http://www.nti.org/e_research/e1_taiwan_1.html#biological> (1 November 2003)


Mauroni, *Chemical and Biological Warfare*, p65.

Nuclear Threat Initiative, ‘South Korea Overview’ <http://www.nti.org/e_research/e1_skorea_1.html> (2 November 2003)

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Central Intelligence Agency (CIA) and Defense Intelligence Agency (DIA), Iraqi Mobile Biological Warfare Agent Production Plants, 28 May 2003: pp1, 2, 4. <http://www.cia.gov/cia/reports/iraqi_mobile_plants/paper_w.pdf> (2 August 2003)


CIA and DIA, Iraqi Mobile Biological Warfare Agent Production Plants, p5.


CIA and DIA, Iraqi Mobile Biological Warfare Agent Production Plants, p1.

CIA and DIA, Iraqi Mobile Biological Warfare Agent Production Plants, p2.


Zanders et al., ‘Chemical and Biological Weapon Developments and Arms Control’, p683; Rosenberg, ‘Defending Against Biodefence’, pp3-4.


Jonathan B. Tucker, ‘Historical Trends Related to Bioterrorism: An Empirical Analysis’, Emerging Infectious Diseases, vol. 5(4), July/August 1999: p502. For the purposes of this paper, acts of BW terrorism are incidents where terrorists use (or believe they are using) real pathogenic micro-organisms. This excludes the phenomenon of white powder hoaxes.

See OTA, Proliferation of Weapons of Mass Destruction, p54.


Gressang, 'Audience and Message', pp85, 90.


Gressang, 'Audience and Message', pp98-100.


Osterholm and Schwarz, Living Terrors, pp24, 78, 91.

Croddy, *Chemical and Biological Warfare*, p16. Particles larger than 10 microns are likely to be blocked in the respiratory tract before they reach the lungs, and particles smaller than one micron are likely to be exhaled: Henry Sokolski, ‘Rethinking Bio-Chemical Dangers’, *Orbis*, Spring 2000: p213.

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Leitenberg, ‘Biological Weapons and Bioterrorism’, p12; Miller et al., *Germs*, p160; Parachini, ‘Putting WMD Terrorism into Perspective’, p42.


Part II: Natural Plagues

Chyba, Biological Terrorism, Emerging Diseases, and National Security, p5.


Brower and Chalk, The Global Threat of New and Reemerging Infectious Diseases, pxiv.


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This biological similarity is also a reason why the internal organs of pigs are good candidates for transplantation into human recipients.

Moore, Killer Germs, p112.
Disease Security in Northeast Asia: Biological Weapons and Natural Plagues


229 Prescott, ‘SARS’, pp211-212.


231 Prescott, ‘SARS’, pp211-212.


233 WHO, *World Health Report 2003*, p75; Prescott, ‘SARS’, p209. No SARS cases or deaths were recorded for North Korea. While Northeast Asia suffered the greatest proportion of SARS infections and deaths, according to the figures in Table 2 the case fatality ratio in the region (around 9.4 per cent) was slightly below the worldwide average (around 11 per cent).


Part III: Towards Disease Security


As discussed in Part I, there are also doubts over whether the micro-organisms contained within a long-range ballistic missile warhead could survive the traumas of space travel and re-entry to the atmosphere.


Martin, ‘The Role of Biological Weapons In International Politics’, p83.

Alibek, Biologizer, p277.


Brower and Chalk, The Global Threat of New and Reemerging Infectious Diseases, pxviii.


Washington Post, 'Japan Cracks Down on Firms Tied to N. Korea', 22 May 2003.


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Zanders, ‘Challenges to Disarmament Regimes’, p373.

Zanders, ‘Challenges to Disarmament Regimes’, pp374-375.


See Wright and Falk, ‘Responding to the Challenge of Biological Warfare’, p57.


VERTIC, Time to Lay Down the Law, p42.


Tucker, ‘Motivations For and Against Proliferation’, p51.


Smithson, ‘Tall Order’, p82.


Khabir Ahmad, ‘Free Tuberculosis Drugs From Novartis’, The Lancet Infectious Diseases, vol. 4(2), February 2004: p66. To characterise such a move as ‘philanthropy’ might be too generous. Some might argue that donations by pharmaceutical companies are motivated simply by a perceived need to enhance their public reputation.

Moodie, Reducing the Biological Threat, p25.


Statement of Ambassador Sha (PRC), Fifth Review Conference of the States Parties to the BWC.
Zou, ‘China: Balancing Disarmament and Development’, p224; Statement of Ambassador Sha (PRC), Fifth Review Conference of the States Parties to the BWC.


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In the October 2001 anthrax attacks in the US, the envelopes containing B anthracis spores also contained a letter instructing the reader to take antibiotics. Arguably, by announcing that an attack was going on, the perpetrator intended that only limited damage would result. The perpetrator’s main intention might have been to cause immense disruption and panic.


Prescott, ‘SARS’, pp210-211.


Prescott, ‘SARS’, p221.


See Prescott, ‘SARS’, p220.
Wheelis, ‘Investigations of Suspicious Outbreaks of Disease’, p109. It is unlikely that a case of inhalation anthrax would be misinterpreted as a natural occurrence. In the case of smallpox, an officially eradicated disease, its appearance in humans would only be the result of a deliberate release or a negligent leak from stocks of the virus held in a laboratory.
Fifty-Sixth World Health Assembly (WHA), ‘Revision of the International Health Regulations’, Resolution WHA56.28, 28 May 2003.
Most Northeast Asian countries fall within the jurisdiction of the WHO Western Pacific Regional Office, headquartered in Manila, Philippines. North Korea is part of the WHO Southeast Asia Regional Office, headquartered in New Delhi, India.
Brower and Chalk, The Global Threat of New and Reemerging Infectious Diseases, pxvi.


Webby and Webster, 'Are We Ready for Pandemic Influenza?', p1522.


Huang, 'Mortal Peril', p2.


Japan Today, 'Court Admits Germ Warfare but Says No to Damages', 27 August 2002.

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Responses to deliberate disease cannot reasonably be separated from responses to disease threats of natural origin. When contemplating disease within the discipline of security studies, the focus of scholarly analysis and policy making must expand beyond biological weapons issues alone. Infectious pathogens, whatever their origin, can exact a great human toll and impose a costly and destabilising burden on states. Such is the realm of concern for disease security.

— Christian Enemark