

# **Bioterrorism Deterrence: the Role of Public Health in Security**

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This paper will explore the relationships between and impacts of re-emerging infectious disease on international security and the role of international and domestic public health infrastructure of reducing the threat of biological terrorism. What does the reemergence of polio say about the affect of a potential bioterrorist attack on the developed and the developing world? Re-emerging infectious disease and the lack of public health infrastructure is a novel model for indirect deterrence and dis-motivation to commit acts of biological terrorism by foreign bioterrorists. A bioterrorist attack, especially one with a contagious agent like smallpox or pneumonic plague, will impact the developing world substantially more than the U.S. or other nations with robust public health sectors. One only has to look as far as polio's reemergence in 2003 to see the very real repercussions, in terms of lives affected and cost, of a contagious virus on the developing world. This paper intent is to examine polio's reemergence in 2003, its subsequent spread, assess the implications for biological terrorism deterrence, and make recommendations with respect to international public health and security policy.

## **Background and Motivation**

Although the subject of bioterrorism is an emerging concept, humans have been using biological weapons throughout history. For example, in 1346 the Tartar army threw the corpses of people that died from of the plague over the walls of the city of Kaffa during a siege. The issue of terrorist groups utilizing biological weapons against other states is a mounting concern due to the fact that dangerous pathogens have been known to cause deadly effects, yet very little weapons deterrence research addresses methods of dealing with the threat of bioterrorism. Bridging the gap between life sciences and political science is a crucial element that can lead to successfully deterring bioterrorism.

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The role of a robust public healthcare system, compared to those of developing nations, for its deterrence capacity can be explored through an empirically driven case study method against predominant theories of deterrence<sup>2</sup> and in comparison to other works considering the possibility of deterring bioterrorism.<sup>3</sup> Whether one is focusing on the next influenza pandemic, bioterrorism, or the use of biological weapons by a rogue state, the role of a robust public health system for 21<sup>st</sup> Century deterrence remains to be explored. There has not been a substantive consideration of our robust public health system as a strategic asset in a more active deterrence role.

### **Re-emergence of Polio**

At the beginning of 2003, the complete eradication of polio appeared to be within the grasp of the World Health Association and its many partners. In 1998, the World Health Organization estimates there were over 365,000 new cases of polio; by early 2003, the rate of infection had declined to less than 1,000 new cases worldwide due to a vigilant vaccination effort.<sup>4</sup> That trend was interrupted in August 2003, however, when unfounded allegations of contaminated vaccines that would lead to sterility, hinder testicular development and cause AIDS ran rampant in northern Nigeria's most populous, predominantly Muslim State, Kano, which had adopted Sharia or Islamic law in 2000. What started with the refusal of local clerics to allow vaccination led to the reestablishment or importation of the poliovirus to fourteen countries that were previously disease-free.

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<sup>2</sup> Robert F. Trager and Dessislava P. Zagorcheva (2006/06) "Deterring Terrorism: It Can Be Done," *International Security*, vol 30, no 3, pp. 87-123; Doron Almog (2004-05) "Cumulative Deterrence and the War on Terrorism," *Parameters*, pp. 4-19; David K. Levine and Robert A. Levine (2006) "Deterrence in the Cold War and the 'War on Terror,'" *Defence and Peace Economics*, vol 17, no 6, pp. 605-617; and Mark H. Lunardi, *War in the Shadows: Deterrence and the Struggle Against Terrorism*, May 2001, DTRA report, DTIC # ADA406551..

<sup>3</sup> Gregory Koblenz (2003) "Pathogens as Weapons: The International Security Implications of Biological Warfare," *International Security*, vol 28, no 3, pp. 84-122; Susan Martin (2002) "The Role of Biological Weapons in International Politics: The Real Military Revolution," *The Journal of Strategic Studies*, vol 25, no 1, pp. 63-98; and Francisco Galamas (2008) "Biological Weapons, Nuclear Weapons and Deterrence: The Biotechnology Revolution," *Comparative Strategy*, vol 27, no 4, pp. 315-323

<sup>4</sup> Ebrahim Samba, Francis Nkrumah, and Rose Leke (2004) "Getting Polio Eradication Back on Track in Nigeria," *New England Journal of Medicine*, vol 350, pp. 645-646.

Transport of the contagious virus was not limited to neighboring African states. The poliovirus moved through Sudan to Ethiopia crossing the Red Sea to Lebanon, Saudi Arabia and Yemen. The latter was particularly severely affected, witnessing more than five hundred new cases in the first half of 2005 alone. The poliovirus spread as far as Indonesia, where it afflicted more than 150 people in a single year in two provinces, predominantly children.<sup>5</sup> Prior to this outbreak, Indonesia had been polio free for nine years. Genetic fingerprinting confirmed that the virus crippling children in Indonesia came from northern Nigeria through Sudan, most closely resembling an isolate recovered in Saudi Arabia in December 2004. A pilgrim returning from Mecca or a returning foreign worker is suspected to have brought the virus to the island of Java, across an ocean and thousands of miles from its source. The primary cause of this spread is likely to be attributable to individuals engaging in religious pilgrimages to Mecca, Saudi Arabia.

Countries that experience trends in poliovirus outbreaks appear to have a crucial commonality: social and political challenges impeding public health efforts that are the key to permanently eradicating polio. Before 2003, polio had largely been confined to a handful of countries; Nigeria, India, Pakistan and Afghanistan accounted for 93% of the world's cases.<sup>6</sup> Unlike the rest of the world, these four countries have never succeeded in interrupting the transmission of wild type poliovirus. Confirmed cases of poliomyelitis in twelve other countries, such as Niger and Nepal resulted from importing the virus from neighboring countries where the virus was endemic, especially Nigeria. In places such as India, the center of the current circulation of the virus is in places where underserved people live, such as the minority Muslim population where 70% of cases occur.<sup>7</sup> Over the past few years, the effort to eradicate polio has been confronted with numerous challenges and outbreaks have resulted in twenty-five different countries, which were controlled only after more than two years of effort and at least \$400 million in supplemental immunization activities.<sup>8</sup>

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<sup>5</sup> Mark A. Pallansch and Hardeep S. Sandhu (2006) "The Eradication of Polio - Progress and Challenges," *New England Journal of Medicine*, 14 December, vol 355, pp. 2508-2511.

<sup>6</sup> P.D. Minor (2004) "Polio eradication, cessation of vaccination and re-emergence of disease," *Nature Reviews Microbiology*, vol. 2, no 6, pp. 473-482.

<sup>7</sup> David L. Heymann and R. Bruce Aylward (2004) "Eradicating Polio," *New England Journal of Medicine*, vol 351, pp.1275-1277.

<sup>8</sup> Stephen L. Cochi and Olen Kew (2008) "Polio Today: Are We on the Verge of Global Eradication?" *JAMA*, vol 300, no 7, pp. 839-841.

A pathogen has the potential to greatly damage a state or population, especially if they do not possess sufficient resources to isolate and treat it. There have been many pandemics through history that have wreaked havoc on human populations, a few being the black plague in 14<sup>th</sup> century Europe, cholera, and Spanish flu of 1917-1918. Outbreaks of dangerous pathogens have harmful impacts on the global economy and international security. An outbreak of an infectious disease in a certain state or region is detrimental for the economy for two main reasons: first, preventative and treatment measures for diseases are extremely expensive from vaccines, to medications, to hospitals can amount to a large amount of money lost not just for an individual infected but for the government as well. Second, an outbreak of an infectious disease will cause other states involved in trade with that state to halt all commercial relations as a precaution against the spread of the disease and countries that rely on trading of their goods for revenue will suffer great financial losses.

### **Domestic Public Health System for Risk Reduction**

Domestically, credible voices highlight unquestionable declines in our own public health infrastructure. Beyond the passive or re-active defense component as part of Homeland Security, recognizing how strong and comprehensive our system is comparatively should not be used as a rationale to keep stagnant or decrease investment in our public health infrastructure. Quite the contrary, the robust nature of our public health system is a strategic asset. In thinking about public health as purely a responsive or passive part of homeland security, current national security policy is missing the more pro-active role that it could play. As the presence of a ballistic missile defense system is supposed to be an existential deterrent itself, so is a strong public health system.

A strong public health infrastructure is likely to be the key in reducing the vulnerability to bioterrorism attack. What is its role in deterring a biological weapons attack from a terrorist group? If a biological weapon launched by a terrorist group will have little or no effect on the target country, then a terrorist may be discouraged from launching a biological weapons attack in the first place. Rather than simply having limited effect on a target country, however, the release of a dangerous pathogen is likely to have the reverse effects intended by the terrorists,

due to the poor health infrastructure of the sanctuary countries. The release of a dangerous pathogen will most likely cause negative effects to nations with limited public health infrastructures.

### **Deterring Terrorism**

Traditional deterrence strategy consists of two key elements: (1) a threat intended to force the adversary to reconsider his behavior, and (2) an alternative course of action implicitly or explicitly offered. Within the broad concept of deterrence are two subcategories—deterrence by punishment and deterrence by denial. Deterrence by punishment strives to halt an attack by threatening to harm something the attacker finds of value. Deterrence by denial assumes a defensive approach to terrorism, ultimately aiming to decrease terrorist motivation by fortifying targets of attack.<sup>9</sup> For either method to be successful, two conditions must be met: (1) an understanding of the threat, and (2) rational decision-making based on cost-benefit analysis. Furthermore, for deterrence by punishment to succeed, additional conditions must hold: the adversary must have something of value to be at risk which they deem more valuable than their gains from a credible attack. The ultimate policy agenda item of deterrence is to weaken the global terrorist network.

There exist three significant obstacles to applying deterrence strategies to terrorism, each central to the defining characteristics of terrorists: irrational actors unmoved by cost-benefit calculation; high motivation bordering on fanaticism; and misattribution of attack, or the “return address” problem associated with a non-state actor. Altering the approach and aim of deterrence strategies can mitigate these obstacles to better suit the circumstances.

The problem of irrationality posits that terrorists are fanatical actors incapable of making sound and logical decisions. As such, irrational actors cannot meet the two conditions for successful deterrence—understanding the threat, and calculating the costs and benefits of an attack. Yet, this behavior does not preclude not is it mutually exclusive to terrorists, and the decision to resort

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<sup>9</sup> Trager, Robert F. and Dessislava P. Zagorcheva. “Deterring Terrorism: It Can Be Done”. *International Security*, vol. 30, no. 3 (Winter 2005/06). pg. 89-91, 106.

to terror, in fact, indicates some level of strategic choice. Complete rationality need not be met for a terrorist to be dissuaded.

Varying levels of motivation must also be approached appropriately, factoring in each terrorist's methods and likelihood of success. For less motivated actors, the risks associated with detection outweigh the benefits of a successful attack. For those whose demands can be partially accommodated, the goal of the deterring state is to find preferable commonalities between them and the aggressor in order to appease the terrorist and deter larger-scale damage. When dealing with highly motivated groups whose preferences are diametrically opposed to the deterring state, complete deterrence cannot be achieved, though some influence is possible.<sup>10</sup>

Finally there is the issue of the return address problem, central to the ubiquitous quality of terrorists who exist separately from state-sponsored organizations. This lessens the strength of traditional forces by removing the "bull's-eye" from the map and stretching the location of the terrorists across borders. Deterrence is still possible in these circumstances because, for a terrorist group to be stymied, complete annihilation of the group is not necessary; rather, severe disruption of the processes can attain successful deterrence.<sup>11</sup>

### **Deterring Biological Weapons**

Some scholars have asserted that biological weapons are most suitably used as a strategic deterrent because "effective deterrence requires only a small possibility of great destruction".<sup>12</sup> Biological weapons are relatively cheap and accessible for a weapon of mass destruction, especially compared to the obstacles in attaining and developing nuclear weapons. Yet, it is not without obstacle that biological weapons can be used as a strategic deterrent. The most common obstacles impeding the use of biological weapons include the need for stability of the agent, the relative unpredictability of the agent and the delay between the use and the desired effect.<sup>13</sup>

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<sup>10</sup> Trager, Robert F. and Dessislava P. Zagorcheva. "Deterring Terrorism: It Can Be Done". *International Security*, vol. 30, no. 3 (Winter 2005/06). pp. 95, 98, 105.

<sup>11</sup> Trager, Robert F. and Dessislava P. Zagorcheva. "Deterring Terrorism: It Can Be Done". *International Security*, vol. 30, no. 3 (Winter 2005/06). pg. 110.

<sup>12</sup> Martin, Susan B. "The Role of Biological Weapons in International Politics: The Real Military Revolution." *The Journal of Strategic Studies*, vol. 25, no. 1 (March 2002). pg. 76.

<sup>13</sup> Martin, Susan B. "The Role of Biological Weapons in International Politics: The Real Military Revolution." *The Journal of Strategic Studies*, vol. 25, no. 1 (March 2002). pp. 71-74.

### **Distinct Challenges of Deterring Bioterrorism**

All too often, policymakers add the issue of bioterrorism under the auspices of deterrence strategies associated with nuclear weapons. Yet this undermines and simplifies the distinct characteristics of deterring bioterrorism. One such method often attempted without total success is focusing on pathogen security, or securing and denying access to the materials necessary to development biological weapons. Based on the model and success found with nuclear non-proliferation, pathogen security strives to control the materials, equipment and personnel involved with biological weapons manufacturing. With nuclear weapons, patrolling the fissile materials proved successful because of some key characteristics of the ingredients. Those same characteristics that make nuclear weapons easy to track are those that make biological weapons material difficult to monitor. These characteristics include presence in nature, production costs, diversity of material and other legitimate uses. These differing features are often overlooked by policymakers who, instead, attempt to mimic similar methods due to their familiarity with nuclear deterrence.<sup>14</sup>

Rather than the typical focus on securing biological materials and laboratories from misuse, other recommendations and effective programs include: (1) biosurveillance; (2) early detection; (3) global laboratory and research cooperation; (4) research and development of diagnostics and countermeasures; (5) international stockpiles of effective medical countermeasures; and (6) response and mitigation capabilities.<sup>15</sup>

### **Fourth Wave of Deterrence**

The first three waves of deterrence theories were influenced by the bipolar power struggle of the Cold War and the potential consequences of a nuclear attack. The fourth wave deals with the recent emergence of asymmetric threats posed by terrorists since the collapse of the Soviet Union. Asymmetric threats include weapons of mass destruction (WMD) proliferation to rogue states and of the growing threat of terrorism and insurgency. The idea of the fourth wave is informal and conceptual and is a direct response to current events. The theory does not disprove

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<sup>14</sup> Ostfield, Marc. "Pathogen Security: The Illusion of Security in Foreign Policy and Biodefense." *Int. J. Risk Assessment and Management*, vol. 12, nos. 2, 3, 4, 2009. pp. 205, 210.

<sup>15</sup> Ostfield, Marc. "Pathogen Security: The Illusion of Security in Foreign Policy and Biodefense." *Int. J. Risk Assessment and Management*, vol. 12, nos. 2, 3, 4, 2009. pg. 214.

previous waves of thought; in fact, it is a collection of the successful and pertinent aspects of all previous notions of deterrence. Fourth wave supports the idea that deterrence is important, now more than ever, and posits that deterrence is both possible and variable. In general, the fourth wave rejects the notion that “one size fits all”, and aims to utilize positive incentives and diplomatic engagement as a means to an end.<sup>16</sup>

There are several types of definable deterrence strategies within the concept of fourth wave. “Indirect deterrence” focuses on third party players and their roles in terrorist attacks. Third parties are typically state sponsors or supporting financiers. This theory is based on the notion that while a terrorist may be willing to die for his cause, it is less likely that a wealthy financier is willing to pay a similar retribution for his actions. “Collective actor deterrence” utilizes the power and influence of institutions like the United Nations or NATO to stymie terrorist actions, highlighting the legitimacy of the organization rather than the interests of a single state. “Internalized deterrence” plays off the psyche of a terrorist, combining abstract concepts of criminology and social constructivism to subconsciously deter a terrorist through social taboos and norms. It comes to question, however, whether a rogue state or terrorist group is influenced by societal norms and taboos, considering that these groups rarely have a constituency to answer to and exist outside the margins of normalcy. “Detercion” combines the ideas of deterrence and coercion, but is generally viewed as a weak concept. “Tailored deterrence”, as the name indicates, attempts to individualize each situation to reach the best possible solution. “Cumulative deterrence” is a practice in patience and diligence which has proven successful in the case of Israel against the Arab world. By demonstrating patience, consistency and prior success, this theory proposes to eventually break down the enemy, and is comparable to the theory of deterrence by denial, in this case, denial of success.

## **Method and Data**

In order to deter a potential attack from terrorist groups, it is important to have a health infrastructure that is strong enough to provide preventative and curative measures should people be infected by a pathogen. In order to ensure that a country’s health infrastructure is strong, a

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<sup>16</sup> Knopf, Jeffrey. “The Fourth Wave in Deterrence Research: An Appraisal”. APSA Convention, Boston, MA, 28-31 August 2008.

government must invest economically into the public health system that allows for the accessibility of needed resources such as physicians, equipment, medications, and vaccines. The relationship between per capita government expenditure per year (in \$) and on health and the number of polio cases in the country per year was examined in order to determine how the strength of a healthcare system affects the spread of infectious diseases. Data is presented from 2000-2005.

**Endemic Muslim countries**

	2000	2003	2005
Nigeria	\$13/ 638 cases	\$13/ 355 cases	\$14/ 77 cases
India	\$13/ 265 cases	\$15/ 225 cases	\$9/ 14 cases
Afghanistan	<\$1/120 cases	\$2/ 8 cases	\$5/ 0 cases
Pakistan	\$9/ 199 cases	\$7/ 103 cases	\$9/ 7 cases

**Non-endemic Muslim countries**

	2000	2003	2005
Kuwait	\$391/ 0 cases	\$433/ 0 cases	\$378/ 0 cases
Saudi Arabia	\$430/ 0 cases	\$436/ 0 cases	\$434/ 0 cases
Turkey	\$272/ 0 cases	\$359/ 0 cases	\$422/ 0 cases
UAE	\$478/ 0 cases	\$491/ 0 cases	\$447/ 0 cases

**Non-endemic non-Muslim countries**

	2000	2003	2005
Chile	\$280/ 0 cases	\$320/ 0 cases	\$343/ 0 cases
Mexico	\$236/ 0 cases	\$275/ 0 cases	\$329/ 0 cases
USA	\$1997/ 0 cases	\$2527/ 0 cases	\$2861/ 0 cases
UK	\$1493/ 0 cases	\$1944/ 0 cases	\$2262/ 0 cases

## **Results**

According to the data, there is an inverse relationship between government health expenditure in health and number of polio cases. This is not an unexpected result. Within the endemic Muslim countries Afghanistan and Pakistan, an increase in the amount spent on healthcare results in a decrease in the amount of polio cases. The non-endemic Muslim exhibit a much larger government health expenditure and the data shows 0 cases of polio in all four countries from 2000 to 2005 as expected. The non-endemic non-Muslim countries illustrate an even larger increase in government expenditure on health and equal to the non-endemic Muslim countries, all four countries and also exhibit no cases of the poliovirus from 2000 to 2005. Examining the overall data, in 2000, 2003, and 2005 the endemic Muslim countries spent an average of \$9.16 per capita with an average of 167 polio cases. The non-endemic Muslim countries spent an average of \$414 with an average of 0 polio cases. The non-endemic non-Muslim countries spent an average of \$1239 with an average of 0 polio cases.

## **Conclusions**

The United States and other western countries have successfully eradicated polio, yet the virus continues to persist in a limited number of States in the developing world, specifically in Nigeria, Pakistan, Afghanistan, and parts of India. The differentiating factor in these two regions is the health infrastructure and the important role it plays in reducing the effects of an infectious disease. For example, the health care infrastructure in the United States has enough resources to prevent and treat an outbreak of polio should the virus re-emerge, but Nigeria, Pakistan, Afghanistan and India's health infrastructure does not have adequate resources to react to the re-emergence of polio, thus the virus continues to damage the population and the economy of those countries.

Polio represents a novel model for deterrence against committing acts of biological terrorism by radical Islamists or other non-state actors. A bioterrorist attack, especially one with a contagious agent like smallpox or pneumonic plague, will impact the Moslem world substantially more than the US. One only has to look as far as polio's reemergence to see the very real repercussions of a contagious virus on the Muslim world. Since its re-emergence in 2003, polio has spread rapidly.