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# **The Economic Impacts of Bioterrorist Attacks on Freight Transport Systems in an Age of Seaport Vulnerability**

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# 1.0 Executive Summary

## 1.1 Importance of Seaport-Based Transport Systems to the United States and World Economy

Twenty percent (\$2 trillion) of the U.S. economy depends on trade and transport. Ninety percent of this, by weight, or 10 percent by value, is transported in shipping containers. Thirty percent of the \$40 trillion world economy, or \$13 trillion worth of goods, moves through world seaports yearly.

## 1.2 The BioTerrorist Threat to Population and Economy: Weapons, Targets, Aim Points

- **Bioterrorist Threat** of clandestine release of aerosols of weaponized deadly contagious disease (smallpox, plague) in crowded air, sea, rail, or subway terminals, infecting thousands to millions, killing 30 percent of those infected.
- **Priority Targets:** Major population, commercial, transportation, and government centers. The top three are New York, DC, and LA.
- **Aim points:** Crowded indoor public spaces with many passing travelers likely to spread the disease, such as airline, railroad, bus, and subway terminals and convention halls and malls.

## 1.3 Costs and Consequences of Successful Bioterrorist Attacks Today

Deaths and Damages under currently inadequate defense conditions:

**Table 1-1**

**Costs: 2003 Bioterrorist Attack**

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Deaths	30,000 – 3,000,000
Value of Statistical Lives Lost, at \$3 Million Each	\$90 Billion – \$9 Trillion
Property Damage – Direct	\$1 Billion – \$10 Billion
Trade Disruption	\$20 Billion – \$200 Billion
Indirect costs (multiplier = 2)	\$42 Billion – \$420 Billion
TOTAL Costs	Hundreds Billions to Trillions

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## 1.4 Reduced Risks and Costs with Improved BioDefenses

Improved Biodefense costs \$10 Billion per year for:

1. 10,000 biodetectors installed in 100 cities for environmental surveillance and warning
2. Improved biolab capacity to identify and confirm pathogens released
3. Pre-positioned vaccines and antibiotics for prompt prophylactic treatment on warning
4. C3I and Vaccinated Vaccinators & Transporters for Logistic Support of (3)
5. Pre- and Post-Attack Weekly/Daily Public/Professional Education on what to do, not do.

**Table 1-2**

### Costs of Attack and Cost of Improved Defense

	<b>2003 BioAttack with Inadequate Biodefenses</b>	<b>2005 BioAttack with Improved Biodefenses</b>
Deaths	30,000 – 3 Million	1,000 – 3,000
Value of Statistical Lives	\$90 Billion – \$9 Trillion	\$3 Billion – \$9 Billion
Property Damage, Direct	\$1 Billion – \$10 Billion	\$1 Billion – \$5 Billion
Trade Disruption	\$20 Billion – \$200 Billion	\$1 Billion – \$5 Billion
Indirect (multiplier = 2)	\$42 Billion – \$420 Billion	\$3 Billion – \$20 Billion
TOTAL Attack Costs	Hundreds of Billions	\$5 Billion – \$30 Billion
+ Cost of Defense	<\$1 Billion spent now	\$10 Billion recommended
TOTAL Cost of Attack Damage Plus Defense (excluding loss of life costs)	\$43 Billion – \$421 Billion	\$15 Billion – \$40 Billion

## 1.5 Dual-Benefit, Dual-Use Collateral Benefits for Public Health and Security of the Recommended \$10 Billion Investment in Seaport Security from Biological Terrorist Attacks

- Improved public health disease surveillance, early warning, and more timely epidemic containment, leading to reduced mortality and morbidity from natural diseases
- Improved public health and medical care surge capacity for responding to non-terrorist natural disasters such as earthquakes, floods, hurricanes, industrial hazardous waste spills, etc.
- Improved biomedical capacity for early identification of emerging natural diseases and timely development of biomedical countermeasures/treatments.
- Improved diagnostic capabilities among trained public health first responders for identifying and treating appropriately natural communicable and non-communicable disease outbreaks

- Improved vaccines, antibiotics, and medicines reducing the costs and improving the effectiveness of treatments of natural infectious diseases

The above dual benefits to peacetime public health and health care resulting from improved public health defenses against bioterrorist attacks have not been quantified, but they are believed to be substantial enough to reduce the net costs of the improved biodefenses significantly.

Our investigation of the economic impacts of bioterrorist attacks on U.S. seaport-based container freight transportation systems yielded a disturbing finding: The freight transportation systems vital to the U.S. economy are vulnerable to attack by biological weapons. Indeed, bioterrorism presents an urgent danger not just to these systems and the seaport cities in which they are located, but to the entire population of the United States. In our view, the threat of bioterrorism today rivals the nuclear threat that has overshadowed this country for the last fifty years. Furthermore, we believe that the deterrent strategies that have held the nuclear threat at bay for half a century are unlikely to be as effective against the threat of bioterrorism.

The events of September 11, 2001 dramatized the risk and demonstrated the consequences of the U.S. transportation system being recruited to serve terrorist aims. The U.S. government response to those events—to blockade its own sea- and airports for a week—may have incurred losses as great as the estimated \$50 billion World Trade Center direct costs themselves. Airlines and airfreight companies lost billions of dollars. Container shipping fared worse, losing a billion dollars a day during months spent disentangling freight traffic. Imagine the even greater costs of a self-imposed shutdown of all forms of transportation—road and rail as well as sea and air—in response to a bioterrorist attack, especially one involving a deadly and highly contagious disease. We began to see our original research mandate in the context of a much larger, grimmer vision of the entire world economy held hostage by this emerging form of deadly global biological warfare.

This harrowing epiphany led us to explore potential defenses against such a threat. Although we found a number of promising possibilities, our relief was only moderate. Why? Implementation of such solutions requires collaboration among people in public health, biomedical research, clinical practice, biophysics, national security, law enforcement, and transportation systems and seaports management. Such collaboration has been slow in coming, in part because of insufficient communication among members of these quite disparate communities. We hope this paper will facilitate crucial interdisciplinary and interagency exchange.

Our assessment shows that an investment of \$5 billion – \$10 billion a year in defenses against bioterrorist attack could save millions of lives and hundreds of billions of dollars, while reducing the risk of damage to the U.S. economy from a catastrophic to a serious but sustainable one. We found three types of defensive measures that showed the most promise for containing the bioterrorist threat: First, BioAttack Early Warning Systems (BAWS), environmental surveillance systems capable of detecting and identifying biological agents within hours, for deployment at major indoor targets in and around seaports, subways, rail, truck, and air terminals. Second, prophylactic biomedical treatment must be ready to be provided immediately to people exposed to any biological agents detected by the BAWS. Such treatment requires highly responsive, mobile public health services equipped with pre-stocked vaccines and antibiotics, supported logistically by vaccinated transportation personnel. Finally, training of port and other transportation personnel on working in contaminated environments may enable container ports and truckers to continue operating while

decontamination is underway, and may enable them to make a crucial contribution to the public health and maintenance of an quarantined population.

Our chief policy recommendation is that \$10 billion per year for such defenses be committed by the Departments of Homeland Security, Health and Human Services, and/or Defense. The Defense Department contribution to this mission and funding is justified by the co-location of many military facilities with seaports, the copious use of civil maritime and air transport for military logistic support, and the greater technical competence and experience of the military in dealing with the threat of biological weapons. Given the great and urgent threat of bioterrorist attacks to the U.S. population, transportation infrastructure, and economy, such funding commitment should occur as soon possible.