Bioweapons DA

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Aff causes a shift to chemical and biological weapons – empirics and economic theory prove.

Horowitz et al 13 – University of Pennsylvania political science professor

[Michael, and Neil Narang, UC Santa Barbara political science, "Poor Man's Atomic Bomb? Exploring the Relationship between 'Weapons of Mass Destruction'," Journal of Conflict Resolution, 58.3, 2013, accessed 12-13-19]

The causes and consequences of nuclear proliferation have received a great deal of academic attention. However, nuclear weapons are rarely discussed in isolation in policy circles. Instead, nuclear weapons are relevant as part of a category of weapons of mass destruction (WMDs) that includes chemical and biological weapons (CBWs). Are the factors that drive CBWs proliferation similar to those that drive nuclear proliferation? What is the relationship between these weapons types? In this article, we explore whether nuclear weapons and CBWs serve as complements or substitutes. **Using newly collected data on** both **CBWs pursuit and possession over time, we find that n**uclear, biological, and chemical weapons generally function as complements at the pursuit stage. In addition, **countries that acquire nuclear weapons become less interested in pursuing other types of WMDs and are even willing to give them up in some cases.**

What motivates countries to pursue weapons of mass destruction (WMDs)?1 Despite a wave of research over the last several years on the spread of nuclear weapons and the consequences for international security, the spread of chemical and biological weapons (CBWs) remains relatively underexplored. In some ways, this makes sense—the West's concern with Iran's WMD development program is not driven by Iran's chemical or biological weapons programs. Instead, it is Iran's pursuit of nuclear weapons that propels international concern about the Iranian regime. On the other hand, policy makers worried a great deal about Saddam Hussein's CBWs arsenal before the Gulf War—especially after evidence surfaced of Saddam's usage of chemical weapons against the Kurdish population in Northern Iraq. **As the "poor man's** atomic **bomb," CBWs seem to be viewed by many countries as the best chance they have, short of nuclear weapons, at developing deadly weapons to protect themselves against their neighbors—or increase their ability to threaten them.**

In this article, **we present the first rigorous tests measuring the spread of CBWs**, focusing on both the pursuit of these systems and their implications. More important, **we focus on the interaction between bio**logical, chemical, **and nuclear weapons proliferation**, **evaluating the extent to which the pursuit or possession of one type of WMD influences the pursuit of another type** of WMD.

Do policy makers and military leaders treat nuclear, CBWs as substitutes or complements in their overall weapons arsenal? What is the actual relationship between nuclear, biological, and chemical weapons possession empirically? Does possessing a nuclear weapons program or capability increase or decrease the probability that a state will pursue biological or chemical weapons and vice versa? Finally, are the same factors known to be correlated with nuclear weapons proliferation also correlated with CBWs proliferation?

The answers to these questions are important for academics and policy makers. For example**, if the evidence suggests** that **leaders treat nuclear, bio**logical, **and chemical weapons capabilities as substitutes** in their strategic arsenal (perhaps **because each one is perceived to increase national security in a similar way), then analysts should adjust** their **assessments of proliferation risk downward for one capability conditional on observing another.** Conversely, if evidence suggests that leaders treat these weapons technologies as complements, then analysts should adjust their assessments of proliferation risk upward for any one technology upon observing another. Finally, **if** the evidence suggests that **leaders treat the three weapons capabilities as substitutes**, **then efforts to create a more robust nuclear n**on **p**roliferation **r**egime **could have the inadvertent consequence of increasing demand for CBWs capabilities**, **thus shifting prolif**eration **risk.**

Our results demonstrate three critical facets of the relationship between nuclear, biological, and chemical weapons proliferation. First, we find that many of the same security and economic factors that drive nuclear weapons proliferation also influence CBWs proliferation. Second, while we lack causal evidence, our statistical models support our argument that nuclear, biological, and chemical weapons generally function as complements at the pursuit stage. That is, countries that seek one of these weapons generally seek all three simultaneously. Third, there is some tentative evidence that **WMDs do function as substitutes in one important fashion**; **once countries acquire nuclear weapons, they become less interested in initiating pursuit of other types of WMDs and they are more likely to abandon other types of WMDs**. **This key finding provides an empirical basis for the notion that CBWs function as a "poor man's nuclear bomb," since possession of nuclear weapons appears to be systematically associated with a reduction in the demand for less powerful CBWs.**

Our link is specific and statistically sound

Horowitz et al 13 – University of Pennsylvania political science professor

[Michael, and Neil Narang, UC Santa Barbara political science, "Poor Man's Atomic Bomb? Exploring the Relationship between 'Weapons of Mass Destruction'," Journal of Conflict Resolution, 58.3, 2013, accessed 12-13-19]

Finally, we turn to estimating the effect of both nuclear and chemical weapons pursuit and acquisition on the risk of initiating biological weapons pursuit in models 5 and 6. These results are equally interesting because they provide support for the notion that **biological weapons** (in addition to chemical weapons) **can** also **be appropriately considered a "poor man's nuclear bomb."** Similar to the impact of possessing nuclear weapons on the probability a state pursues chemical weapons, **nuclear weapons possession has a strong negative effect on biological weapons pursuit** in both models 5 and 6. **After holding the underlying level of demand constant** in model 6, simply **possessing a nuclear weapon appears to decrease the instantaneous risk that a state will pursue biological weapons to virtually zero** (**1.44 x 10^-7**). **This is consistent with the understanding of nuclear weapons as so powerful that they make the possession of other types of WMDs less relevant**. Even before countries such as the United States abandoned their chemical weapons programs, for example, they abandoned their biological weapons program. **The United States eliminated its offensive BW program under a Nixon administration order in 1969** and had shut down the program by the time it signed the BWC in 1972. **France and Great Britain similarly eliminated their offensive BW programs**. Russia stands in stark contrast to this argument, however. Evidence revealed after the cold war demonstrated that the Soviet Union maintained a vibrant offensive BW program at the Biopreparat complex through the end of the cold war. This demonstrates that grouping CBWs into a single category may not accurately represent the way countries actually think about them. Biological weapons, given their greater theoretical destructive capacity, may be considered somewhat differently. This is a potential path for future research.

Chemical attacks cause extinction.

Gander '18 Kashmira. Citing the Global Catastrophic Risks Foundation's Global Challenges Annual Report, edited by Martin Rees, UK Astronomer Royal, and Co-founder, Cambridge Centre for the Study of Existential Risk, and whose section on chemical warfare was reviewed by Angela Kane, Senior Fellow at the Vienna Centre for Disarmament and Non-Proliferation, visiting Professor at Sciences Po Paris, and former High Representative for Disarmament Affairs at the United Nations. 10-31-2018. "Experts reveal the nine most likely ways the world will end." Newsweek. https://www.newsweek.com/how-will-world-end-experts-reveal-9-most-likely-ways-humans-will-be-wiped-out-1194616

Humanity being annihilated by chemical weapons or the molten lava of a supervolcano may sound like the plots of Hollywood disaster movies, but they are in fact among the **very real ways mankind could be wiped out according to research.** The **G**lobal **C**hallenges **F**oundation—**an organization which aims to reduce the global issues which we all face—highlighted the most probable scenarios to finish off the human race in its annual Global Catastrophic Risks report. To compile the document, researchers assessed scientific papers and consulted academics.** Martin Rees, the U.K.'s Astronomer Royal, and co-founder of the Cambridge Center for the Study of Existential Risk, warned in the report that while most of us are worried about familiar risks like air crashes **"we're in denial about some emergent threats—the potential downsides of fast-developing new technologies and the risk of crossing environmental 'tipping points.' "These may seem improbable, but in our interconnected world, their consequences could cascade globally, causing such devastation that even one such incident would be too many," said Rees.** The likelihood that nuclear war could break out is higher than it was a decade ago, the experts warned. In the wake of the Hiroshima bombing which killed up to 150,000 people in the immediate aftermath, "the world has lived in the shadow of a war unlike any other in history," they said. Weapons with the highest yield have the power to obliterate 80 to 90 percent of lifeforms, including humans, in a 1-4 kilometer radius. With around 7,000 warheads each, the U.S and Russia have the biggest arsenals, with the U.K., France, China, India, Pakistan, North Korea and Israel confirmed or believed to possess some form of nuclear device. A nuclear war could not only wipe out lives and cities, and leave behind the threat of radioactive disease, but the resulting fallout could trigger a mini ice-age. Biological and chemical warfare GettyImages-672115 **A member of the German Chemical Corps, a part of the German military that specializes in anti-nuclear, chemical and biological weapons operations, holds up a rapid tester whose two red lines indicate a positive result for chemical contamination during a demonstration at battalion headquarters November 19, 2001 in Sonthofen, Germany. The Global Challenges Foundations highlighted chemical warfare as a potential threat to human existence.** SEAN GALLUP/GETTY IMAGES **Compared with other** traditional **means** of attack, biological and **chemical weapons are relatively cheap to make. And technological advances in genetic engineering and synthetic biology make it easier** than ever to alter micro-organisms in potentially dangerous ways. If these tiny living things were ever to be released out of a controlled laboratory, by mistake or nefariously, it could "cause a pandemic of unprecedented proportions," the report stated.

BSL lab accidents make airborne TB and H5N1 mutations inevitable – those cause extinction – prefer studies

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book, Beyond the Science: The Business of Drug Development, was published online by BioPharma Dive, a subsidiary of Industry Dive, Inc, written 2-25, "Human error in high-biocontainment labs: a likely pandemic threat", https://thebulletin.org/2019/02/human-error-in-high-biocontainment-labs-a-likely-pandemic-threat/. Rez

Incidents causing potential exposures to pathogens occur frequently in the high security laboratories often known by their acronyms, **BSL3** (Biosafety Level 3) **and BSL4**. **Lab incidents that lead to undetected or unreported lab**oratory-acquired infections **can lead to** the release of a **disease** into the community **outside the lab**; lab workers with such infections will leave work carrying the pathogen with them. If the agent involved were a potential pandemic pathogen, **such a community release could lead to a worldwide pandemic with many fatalities**. Of greatest concern is **a release of a lab-created, mammalian-airborne-transmissible, highly pathogenic avian influenza virus, such as** the airborne-transmissible **H5N1 viruses** created in the laboratories of Ron Fouchier in the Netherlands and Yoshihiro Kawaoka In Madison Wisconsin. Such **releases are fairly likely over time, as there are at least 14 labs** (mostly in Asia) now carrying out this research. **Whatever release probability the world is gambling with, it is clearly far too high a risk to human lives.** Mammal-transmissible bird flu research poses a real danger of a worldwide pandemic that **could kill human beings on a vast scale. Human error is the main cause** of potential exposures of lab workers to pathogens. Statistical data from two sources show that human error was the cause of, according to my research, 67 percent and 79.3 percent of incidents leading to potential exposures in BSL3 labs. These percentages come from analysis of years of incident data from the Federal Select Agent Program (FSAP) and from the National Institutes of Health (NIH). (Details may be found in the Supplementary Material document.) Understanding human error is important to calculating the probability that a pathogen will be released from a lab into the surrounding community, the first step in calculating the likelihood of a pandemic. A key observation is that human error in the lab is **mostly independent of pathogen type and biosafety level**. Analyzing the likelihood of release from laboratories researching less virulent or transmissible pathogens therefore can serve as a reasonable surrogate for how potential pandemic pathogens are handled. (We are forced to deal with surrogate data because, thank goodness, there are little data on the release of potentially pandemic agents.) Put another way, surrogate data allows us to determine with confidence the probability of release of a potentially pandemic pathogen into the community. In a 2015 publication, Fouchier describes the careful design of his BSL3+ laboratory in Rotterdam and its standard operating procedures, which he contends should increase biosafety and reduce human error. Most of Fouchier's discussion, however, addresses mechanical systems in the laboratory. But the **high percentage of human error reported** here calls into **question claims that state-of-the-art design** of BSL3, BSL3+ (augmented BSL3), and BSL4 labs **will prevent** the release of **dangerous pathogens.** How much lab-worker training might reduce human error and undetected or unreported laboratory acquired infections remains an open question. Given the many ways by which human error can occur**, it is doubtful** that Fouchier's **human-error-prevention measures can eliminate release** of airborne-transmissible avian flu into the community through undetected or unreported lab infections. Human-error incident data. In its 2016 study for the NIH, "Risk and Benefit Analysis of Gain of Function Research," Gryphon Scientific looked to the transportation, chemical, and nuclear sectors to define types of human error and their probabilities. As Gryphon summarized in its findings, the three types of

human error are **skill-based** (errors involving motor skills involving little thought), **rule-based** (errors in following instructions or set procedures accidentally or purposely), and **knowledge-based** (errors stemming from a lack of knowledge or a wrong judgment call based on lack of experience). Gryphon claimed that "no comprehensive Human Reliability Analysis (HRA) study has yet been completed for a biological laboratory… . This lack of data required finding suitable proxies for accidents in other fields." But mandatory incident reporting to FSAP and NIH actually does provide sufficient data to quantify human error in BSL3 biocontainment labs. Federal Select Agent Program incident data. FSAP incident data were collected from summary reports to Congress for the years 2009 through 2015. Three of the seven FSAP incident categories involve skill-based errors: 1) **needle sticks** and other through the skin exposures from sharp objects, 2) **dropped containers** or spills/splashes of liquids containing pathogens, and 3) bites or scratches from infected **animals**. Some skill errors, such as spills and needle sticks could be reduced with simple fixes (see below). The rule-based and knowledge-based incident categories are: 4) **pathogens manipulated outside of a biosafety cabinet** or other equipment designed to protect exposures to infectious aerosols; 5) potential exposures resulting from **non-adherence to safety** procedures or deviations from lab standard operating procedures, and 6) failure or **problem with personal protective equipment**–**a mix of skill, rule, or knowledge-based errors.** The seventh category is mechanical or equipment failure, or **defective labware**. Another category not mentioned in the FSAP reports is failure to properly inactivate pathogens before transferring them to a lower biosafety level lab for further research. During the 2009-2015 time period, FSAP received a total of 749 incident reports from select-agent research facilities. Conservatively, 594 or **79.3 percent** of those incidents involve **human error**. (Details may be found in the Supplementary Material.) National Institutes of Health incident data. Incident reports to the NIH Office of Science Policy cover the period from 2004 through 2017 and BSL3 and BSL4 facilities. They were obtained through a Freedom of Information Act request. There were no reported incidents from BSL4 facilities. Reporting to NIH is required only for incidents involving pathogens that contain recombinant DNA. While it is highly likely there have been incidents in BSL4 facilities, they may not have involved pathogens with recombinant DNA and so would not show up in the reports to NIH. The 128 incident reports provide extremely detailed descriptions. The reports are often several-dozen pages long so almost no questions remain about details. Of the 128 incidents, 86 or 67.2 percent were due to human error. This percentage is in the same ballpark as the FSAP reports. Some human errors are "one-off," meaning they happened once and likely won't happen again. **One-off errors are difficult to anticipate**, so it is **unlikely that one can** devise meaningful changes in standard operating procedures to **prevent them**. Here is one example of a one-off error, slightly modified from an incident report: A researcher was exchanging two plastic 24-well plates in the tabletop Sorvall centrifuge. While closing the lid, it was caught on a centrifuge wrench which was accidentally placed into the path of the lid. The wrench jumped and knocked one of the removed 24-well plates onto the counter. The plate landed at approximately a 45-degree angle and lost approximately half its contents to the bench top. For some errors, there are procedural changes that should reduce their frequency. For instance, needle sticks can occur from syringes with sharp metal needles when being used to transfer liquids from one small container to another. For injecting animals, sharp metal needles are needed; but for liquid transfers, blunt-plastic needles would suffice. Also, dropping items could sometimes be prevented using lab carts to transport items from place to place, rather than carrying them by hand. Here are three comments from the aforementioned Fouchier publication. "Only authorized and experienced personnel that have received extensive training can access the facility." "All personnel have been instructed and trained how to act in case of incidents." "For animal handling, personnel always work in pairs to reduce the chance of human error." The first two bullets speak to standard training of lab workers who work with particularly dangerous pathogens. It is **unclear whether** the diligent **training of lab workers** he outlines **would** substantially **reduce human error**: The entities reporting incidents to NIH mention similar diligent training; nonetheless, undetected or unreported laboratory acquired

infections occur with high frequency in these laboratories. Furthermore, it is unclear whether other laboratories creating and researching airborne-transmissible diseases are so carefully designed and diligent in their training. The two-person rule for animal handling is a good idea that is not typically mentioned in the detailed NIH incident reports. Animal bites and needle punctures brought about by unruly lab animals are not uncommon. Release from high biocontainment through incomplete inactivation. Beyond the aforementioned undetected or unreported laboratory-acquired infections lies **another route by which pathogens can be released** from high biosecure level labs—**incomplete inactivation.** Inactivation is designed to destroy the pathogenicity of an infectious agent, while retaining its other characteristics for research in which live pathogens are not needed. Since there are reliable inactivation procedures, **failure to inactivate is a human error.** Pathogens are inactivated for research that can be performed in lower BSL2 biocontainment, where it is much easier to carry out. Research in BSL3 and BSL4 laboratories is difficult, both because of restricted movement in the personal protective equipment that must be worn and because of restrictions in operating procedures that aim to minimize potential exposure to pathogens. While incomplete inactivation does not usually directly cause a release into the community, researchers in BSL2 labs are at **a much higher risk of infection, and their street clothes, hair, and skin can become contaminated.** But incomplete inactivation is a route to potential release into the community. The FSAP does not routinely collect data on incomplete inactivation, and it seems no one else does either. Thus, enough data to calculate probabilities for this type of incident are not available. But the Government Accountability Office (GAO) has weighed in on the issue. The GAO reports anecdotal evidence and some numbers on incomplete inactivation to support the contention that it is a serious issue. The office has identified 11 incidents, in addition to 10 incidents already identified by the FSAP. Notably, two of the incidents involved Ebola and Marburg viruses, which because of a lack of countermeasures (vaccines and antivirals) are researched at BSL4 facilities. Among other things, the GAO report called attention to a well-publicized incident in which a Defense Department laboratory **"inadvertently sent live Bacillus anthracis**, the bacterium that **causes anthrax, to almost 200 laboratories** worldwide over the course of 12 years. The laboratory believed that the samples had been inactivated." The report describes yet another **well-publicized incident in China** in which "two researchers conducting virus research were exposed to severe acute respiratory syndrome (**SARS**) coronavirus samples that were incompletely inactivated. The researchers subsequently transmitted SARS to others, leading to several infections and one death in 2004." The GAO identified three recent releases of Ebola and Marburg viruses from BSL4 to lower containment labs due to incomplete inactivation. A fourth release in 2014 from the **CDC labs occurred** when "Scientists inadvertently switched samples designated for live **Ebola** virus studies with samples intended for studies with **inactivated material**. As a result, the samples with viable Ebola virus, instead of the samples with inactivated Ebola virus, were transferred out of a BSL-4 laboratory to a laboratory with a lower safety level for additional analysis. While no one contracted Ebola virus in this instance, the **consequences could have been dire** for the personnel involved as there are currently no approved treatments or vaccines for this virus." The CDC has issued a report on this mixup, and the steps they have taken to avoid this particular error in the future. All these incidents confirm the role of incomplete inactivation that would lead to an increased likelihood of release into the community from a BSL2 lab. These are **all human errors**, some involving BSL4 pathogens. Along with the observation that other human errors are the cause of more than two-thirds of potential exposures in BSL3 labs, **it is clear that state-of-the-art laboratory design will not prevent release** into the community. The probability of release into the community. In an analysis circulated at the 2017 meeting for the Biological

Weapons Convention, a conservative estimate shows that the probability is about 20 percent for a release of a mammalian-airborne-transmissible, highly pathogenic avian influenza virus into the community from at least one of 10 labs over a **10-year** period of **developing and researching** this type of pathogen. This percentage was calculated from FSAP data for the years 2004 through 2010. Analysis of the FOIA NIH data gives a **much higher release probability**—**that is, a factor five to 10 times higher**, based on a smaller number of incident reports. While there is no obvious reason in the NIH data that would explain this high probability, exposures and latent (not-active) infections with M. tuberculosis was indicated in four incident reports. M. tuberculosis is not a select agent so incidents involving it would not necessarily be reported to the FSAP. Tuberculosis is highly contagious by the airborne route, so it might be easier to acquire a TB infection in the lab. Unfortunately, **airborne TB infections might be a harbinger of what could occur in research on airborne-transmissible flu.** Facility-reported descriptions of the 11 relevant incidents are provided in the Supplementary Material (Appendix 2). Lab-acquired infections are often discovered some time after the incident occurred. Only for three were the causes confirmed to be human error. For the other eight, neither the infected lab workers nor facility officials knew how the infection occurred. While it is likely that human error was involved in many of these eight infections, their causes will never be known. Likelihood that mammalian-airborne-transmissible, **highly pathogenic avian influenza** release **could cause a deadly pandemic.** The avian flu virus H5N1 **kills 60 percent of people** who become infected from direct contact with infected birds. The mammalian-airborne-transmissible, highly pathogenic avian influenza created in the Fouchier and Kawaoka labs should be able to **infect humans through the air**, and the **viruses could be deadly**. A release into the community of such a pathogen **could seed a pandemic with a probability of perhaps 15 percent.** This estimate is from an average of two very different approaches. One approach involves purely mathematical branching theory, where Harvard researcher Marc Lipsitch and coworkers provide a graph in which, conservatively, the probability that a pandemic is seeded from a single release is **about 20 percent**. In the second approach, where infection progress through the community from person to person is simulated, Bruno Kessler Foundation researcher Stefano Merler and coworkers found that there is a probability from five percent to **15 percent** that a single release could seed a pandemic. How deadly and how transmissible such viruses are in humans is not known. Dealing realistically with human errors in lab research. Human error will continue to play a major role in laboratory incidents, and undetected or unreported laboratory acquired infections and incomplete inactivation incidents will continue to occur. **No matter how well facilities are designed** to prevent release into communities, **human error will dodge design.** For an already identified 14 labs creating or researching mammalian-airborne-transmissible, highly pathogenic avian influenza, the potential 16 percent probability of a laboratory release into the community over five years of research (a result found in a study now being prepared for publication) is already uncomfortably high. **NIH incident reports indicate possibly much higher probabilities** of a such a release–thus, a greater likelihood of a pandemic. This does not take into the account a release from **incomplete inactivation.** Combining release probability with the not insignificant probability that an airborne-transmissible influenza virus could seed a pandemic, **we have an alarming situation.** Those who support mammalian-airborne-transmissible, highly pathogenic avian influenza experiments either believe the probability of community release is infinitesimal or

the benefits in preventing a pandemic are great enough to justify the risk. For this research, it would take extraordinary benefits and significant risk reduction via extraordinary biosafety measures to correct such a massive overbalance of highly uncertain benefits to too-likely risks. Whatever probability number we are gambling with, **it is clearly far too high a risk to human lives.** There are experimental approaches that do not involve live mammalian-airborne-transmissible, highly pathogenic avian influenza which identify mutations involved in mammalian airborne transmission. These “safer experimental approaches are both more scientifically informative and more straightforward to translate into improved public health…” Asian bird flu virus research to develop live strains transmissible via aerosols among mammals (and perhaps some other potentially pandemic disease research as well), should for the present be restricted to special BSL4 laboratories or augmented BSL3 facilities where lab workers are not allowed to leave the facility until it is certain that they have not become infected.

That causes extinction

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In the decades to come, **advanced bioweapons could threaten human existence. Although the probability of human extinction from bioweapons may be low, the expected value of reducing the risk could still be large, since such risks jeopardize the existence of all future generations.** We provide an overview of biotechnological extinction risk, make some rough initial estimates for how severe the risks might be, and compare the cost-effectiveness of reducing these extinction-level risks with existing biosecurity work. We find that reducing human extinction risk can be more cost-effective than reducing smaller-scale risks, even when using conservative estimates. This suggests that the risks are not low enough to ignore and that more ought to be done to prevent the worst-case scenarios. How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all future human lives. Historically, **disease events have been responsible for the greatest death tolls on humanity. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics**, such as the plague of Justinian, **are thought to have killed 25 million in the 6th century**—constituting over 10% of the world's population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization. **A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures.** Even evolution itself may work in humanity's favor: **Virulence and transmission is often a trade-off**, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6 **While these arguments point to a very small risk of human extinction, they do not rule the possibility out entirely.** Although rare, **there are recorded instances of species going extinct due to disease**—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, **especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases,** such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and the Western Abenaki (which suffered a staggering 98% loss of population).9 **In the modern context, no single disease currently exists that combines the worst-case levels of**

transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-21 Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record of state-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.22

Delivery capabilities have also been subject to the cutting edge of technical development with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology.23,24 While there is no evidence of state-run bioweapons programs directly attempting to develop or deploy bioweapons that would pose an existential risk, the logic of deterrence and mutually assured destruction could create such incentives in more unstable political environments or following a breakdown of the Biological Weapons Convention.25 The possibility of a war between great powers could also increase the pressure to use such weapons—during the World Wars, bioweapons were used across multiple continents, with Germany targeting animals in WWI,26 and Japan using plague to cause an epidemic in China during WWII.27

Food Impact Add-on (Whole Res)

Bioweapons crush food

Shambhavi 19 "Naik, Shambhavi, research fellow, Ph.D in Cancer Biology from University of Leicester, 3 years of experience as a post-doctoral fellow at NCBS. Takshashila Institution "Assessing Measures for India to Tackle Biowarfare Threats." Takshashila Discussion Document, April 23, 2019-03. https://takshashila.org.in/wp-content/uploads/2019/05/TDD-Bioweapons-Convention-SN-2019-03-1.pdf modified for ableist language

Bioweapons are not only a threat to human life but also **can be used to harm agriculture and animals in a bid to** ~~cripple~~ **[damage] economies or starve human populations**. **The threat to agriculture is more pronounced because the widespread use of gene editing in creating better plant varieties8 has created tools and knowledge that make impacting plants easier**. In 2018, concerns9 were raised about the DARPA-sponsored Insect Allies Program10 - a program meant to respond to natural agricultural requirements by using insect vectors to deliver engineered plant viruses that can deploy gene editing tools to modify the plants. The **knowledge to create tools to modify plants to fight drought or pests is still being canvassed**; and the use of technology developed through Insect Allies Program is currently very limited and requires fine-tuning. **However, the technology can be easily usurped to deliver pathogenic viruses or viruses to adversely affect the plant system.** The usurper would only need to change the cargo that the insects will deliver- a pathogenic virus instead of a courier. **This abuse of the technology could be harnessed quicker than its peaceful purpose. Yet the discussion of agricultural threat is often neglected and does not receive as much attention as threats to human health.**

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Food Impact Add-on (Specific)

Bioweapons crush food

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Bioweapons are not only a threat to human life but also **can be used to harm agriculture and animals in a bid to** ~~cripple~~ **[damage] economies or starve human populations**. **The threat to agriculture is more pronounced because the widespread use of gene editing in creating better plant varieties8 has created tools and knowledge that make impacting plants easier**. In 2018, concerns9 were raised about the DARPA-sponsored Insect Allies Program10 - a program meant to respond to natural agricultural requirements by using insect vectors to deliver engineered plant viruses that can deploy gene editing tools to modify the plants. The **knowledge to create tools to modify plants to fight drought or pests is still being canvassed**; and the use of technology developed through Insect Allies Program is currently very limited and requires fine-tuning. **However, the technology can be easily usurped to deliver pathogenic viruses or viruses to adversely affect the plant system.** The usurper would only need to change the cargo that the insects will deliver- a pathogenic virus instead of a courier. **This abuse of the technology could be harnessed quicker than its peaceful purpose. Yet the discussion of agricultural threat is often neglected and does not receive as much attention as threats to human health.**

Extinction

FDI 12 Future Directions International, a Research institute providing strategic analysis of Australia's global interests; citing Lindsay Falvery, PhD in Agricultural Science and former Professor at the University of Melbourne's Institute of Land and Environment, "Food and Water Insecurity: International Conflict Triggers & Potential Conflict Points," http://www.futuredirections.org.au/workshop-papers/537-international-conflict-triggers-and-potential-conflict-points-resulting-from-food-and-water-insecurity.html

There is a growing appreciation that the **conflicts in the next century will most likely be fought over a lack of resources.** Yet, in a sense, **this is not new. Researchers point to the French and Russian revolutions as conflicts induced by a lack of food.** More recently, **Germany's World War Two efforts are said to have been inspired**, at least in part, **by its perceived need to gain access to more food.** Yet the general sense among those that attended FDI's recent workshops, was that **the scale of the problem in the future could be significantly greater** as a result of population pressures, changing weather, urbanisation, migration, loss of arable land and other farm inputs, and increased affluence in the developing world. In his book, Small Farmers Secure Food, **Lindsay Falvey**, a participant in FDI's March 2012 workshop on the issue of food and conflict, clearly **expresses the problem** and why countries across the globe are starting to take note. .He writes (p.36), "…**if people are hungry**, especially in cities, **the state is not stable** – riots, violence, breakdown of law and order and migration result."¶ "Hunger feeds anarchy."¶ This view is also shared by **Julian Cribb**, who in his book, The Coming Famine, **writes that if**

“large regions of the world run short of food, land or water in the decades that lie ahead, then **wholesale, bloody wars are liable to follow.**” He continues: “**An increasingly credible scenario for World War 3 is** not so much a confrontation of super powers and their allies, as **a festering, self-perpetuating chain of resource conflicts**.” He also says: “The wars of the 21st Century are less likely to be global conflicts with sharply defined sides and huge armies, than a scrappy mass of failed states, rebellions, civil strife, insurgencies, terrorism and genocides, sparked by bloody competition over dwindling resources.”¶ As another workshop participant put it, people do not go to war to kill; they go to war over resources, either to protect or to gain the resources for themselves.¶ Another observed that hunger results in passivity not conflict. Conflict is over resources, not because people are going hungry.¶ **A study by the International Peace Research Institute indicates that where food security is an issue, it is more likely to result in some form of conflict. Darfur, Rwanda, Eritrea and the Balkans experienced such wars**. Governments, especially in developed countries, are increasingly aware of this phenomenon.¶ **The UK Ministry of Defence, the CIA, the** US **C**enter for **St**rategic and **I**nternational **S**tudies **and the Oslo Peace Research Institute, all identify famine as a potential trigger for** conflicts and possibly even **nuclear war.**

Biodiversity Impact Add-on

Genetically engineered pathogens attach to non-human hosts- that kills biodiversity and leads to species extinction

Abboud 18

Catastrophic Impacts of Biological Warfare on Biodiversity By Nura A. Abboud | September 22, 2018 | Environment, Nature, Pollution https://www.ecomena.org/impacts-of-biological-warfare-on-biodiversity/ Nura A. Abboud is an environmental activist and Founder of the Jordanian Society for Microbial Biodiversity (JMB), the only NGO in the Middle East concerning the microbial biodiversity. Nura specializes in molecular biology, biological sciences, microbial biodiversity, genetic fingerprinting and medical technologies. Her vision is to establish an eco-research center in the astonishing desert south of Jordan. She has received several scholarships and awards including honorary doctorate in Environmental leadership.//qlsms

Biological weapons are considered the most dangerous of all known weapons of mass destruction. They are used to deliberately cause epidemics among humans; destroy the environmental components, including water, air, and soil; and target crops and livestock. Examples of diseases used in biological warfare include anthrax, smallpox, plague, cholera, and avian flu. In addition to the catastrophic effects of biological warfare on the biodiversity and the environment, their danger lies in their low cost and rapid spread, as well as their easy preparation, transport, and use.

Unlike nuclear and chemical bombs, biological bombs are without odor or color and therefore cannot be detected. Additionally, bioweapons are dangerous because of their effects on untargeted organisms in a military attack, and the clinical symptoms they create may be difficult to distinguish from normal diseases. Bioweapon pathogens remain in nature for several years and are able to survive in harsh environmental conditions.

Threat to Natural Resources

Bioweapons spread germs that contaminate air, food, water, and the environment, causing epidemiological diseases for different living organisms.

Air: A wide variety of germs can contaminate air and are used in biological warfare. Fungi are the most common, and they travel by air over long distances to infect healthy plants.

Food: Food contamination is also one of the most powerful methods used to carry out biological warfare attacks. Disease is transmitted either directly to humans through contaminated food or drink or indirectly by hosts.

Water: Water can spread a number of lethal infectious agents as well. For example, one gram of Clostridium tetani poison is able to kill eight million people within six hours.

Threats to Biodiversity

Diseases are one of the main drivers of extinction in endangered species; therefore, disease control is fundamental to preserve biodiversity. Despite the presence of vaccines and drugs for most bioweapons, they may not be available in adequate quantities to cope with an epidemiological disease outbreak.

Biological attacks pose a threat to naturally rare wild plants and animals and to species whose natural habitats have been degraded by human activities. Furthermore, diseases that humans, domestic animals, and domestic plants have been able to develop immunity to can be fatal in wild animals and plants. Bioweapons are not only having direct effects on the genetic biodiversity of indigenous species but also are having direct and indirect catastrophic effects on vital plant and animal communities.

Threats to Animal Biodiversity

Conservation of livestock breeds is essential to maintaining genetic diversity, which in turn is vital to increasing the ability of living organisms to adapt to environmental changes. The danger of bioweapons regarding animal biodiversity is summarized in three main points:

The direct impact of diseases on wild species

Some deadly diseases in humans or domestic animals can infect wild animals. For instance, an epidemic destructive impact on endangered species is reflected in the effects of Canine distemper, a natural viral disease that infects wild dogs and wild animals belonging to the same group. Canine distemper was also developed in bioweapon laboratories.

Over the past decade, the spread of this disease has resulted in habitat loss and in the extinction of a large number of wild species in North America. Additionally, it led to the elimination of about one-third of the lion population in Tanzania and had serious impacts on the endangered leopard population.

Invasive species

The history of rinderpest in Africa provides a model for predicting the potential effects of lethal diseases on wild species and livestock. In 1887, **European colonial armies introduced the rinderpest virus to Africa through imported cattl**e, which led to a rinderpest outbreak among domestic cattle breeds and wild species**, killing an estimated 90–95% of African cattle and buffaloes within three years.**

To control the epidemic, African herds and buffaloes have been destroyed in most parts of Africa. Despite efforts to combat rinderpest over the past century, the disease is still strong, and its outbreak in the region occurs frequently.

Elimination of animal species, hosts, and vectors

Threatened species may be destroyed in areas that have been subjected to biological attacks with the aim of eradicating the disease. For example, in the United States, programs to control brucellosis in livestock have resulted in killing large numbers of wild animals, including the Bison and the white tailed deer.

Threats to Plant Biodiversity

Microbes can be used in crop destruction. For instance, "Rice blast" is a disease affecting rice and therefore leads to crop destruction and genetic changes in the plant.

Conclusion and Recommendations

The discussion about controlling destructive bioweapons is growing, as they pose a vast danger to both humanity and the environment alike. Any failure to prevent biological attacks can lead to the deterioration of genetic diversity in animals and plants, the extinction of endangered species, and the destruction of human livelihoods and traditional cultures.

Biotechnology has increased the economical value of genetic diversity of living organisms; hence, it has increased the risk of eliminating genetic diversity through the use of GMO bioweapons. Most of all, the environment will be the silent victim of this war..

Biodiversity loss causes extinction – outweighs and is a threat multiplier

Torres 16 [Phil Biologist, conservationist, science advocate & educator. 2 years based in Amazon rainforest, now exploring science around the world. "Biodiversity Loss: An Existential Risk Comparable to Climate Change" http://futureoflife.org/2016/05/20/biodiversity-loss/]

According to the Bulletin of Atomic Scientists, the two greatest existential threats to human civilization stem from climate change and nuclear weapons. Both pose clear and present dangers to the perpetuation of our species, and the increasingly dire climate situation and nuclear arsenal modernizations in the United States and Russia were the most significant reasons why the Bulletin decided to keep the Doomsday Clock set at three minutes before midnight earlier this year.

But there is another existential threat that the Bulletin overlooked in its Doomsday Clock announcement: biodiversity loss. This phenomenon is often identified as one of the many consequences of climate change, and this is of course correct. But **biodiversity loss is also a contributing factor behind climate change**. For example, deforestation in the Amazon rainforest and elsewhere reduces the amount of carbon dioxide removed from the atmosphere by plants, a natural process that mitigates the effects of climate change. So **the causal relation between climate change and biodiversity loss is bidirectional.**

Furthermore, there are myriad phenomena that are driving biodiversity loss in addition to climate change. Other causes include ecosystem fragmentation, invasive species, pollution, oxygen depletion caused by fertilizers running off into ponds and streams, overfishing, human overpopulation, and overconsumption. All of these phenomena have a direct impact on the health of the biosphere, and all would conceivably persist even if the problem of climate change were somehow immediately solved.

Such considerations warrant decoupling biodiversity loss from climate change, because the former has been consistently subsumed by the latter as a mere effect. Biodiversity loss is a distinct environmental crisis with its own unique syndrome of causes, consequences, and solutions—such as restoring habitats, creating protected areas ("biodiversity parks"), and practicing sustainable agriculture.

Deforestation of the Amazon rainforest decreases natural mitigation of CO2 and destroys the habitats of many endangered species.

The sixth extinction.

The repercussions of biodiversity loss are potentially as severe as those anticipated from climate change, or even a nuclear conflict. For example, according to a 2015 study published in Science Advances, **the best available evidence reveals "an exceptionally rapid loss of biodiversity over the last few centuries, indicating that a sixth mass extinction is already under way."** This conclusion holds, even on the most optimistic assumptions about the background rate of species losses and the current rate of vertebrate extinctions. The group classified as "vertebrates" includes mammals, birds, reptiles, fish, and all other creatures with a backbone.

The article argues that, using its conservative figures, the average loss of vertebrate species was 100 times higher in the past century relative to the background rate of extinction. (Other scientists have suggested that the current extinction rate could be as much as 10,000 times higher than normal.) As the authors write, "The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth's history." Perhaps the term "Big Six" should enter the popular lexicon—to add the current extinction to the previous "Big Five," the last of which wiped out the dinosaurs 66 million years ago.

But the concept of biodiversity encompasses more than just the total number of species on the planet. It also refers to the size of different populations of species. With respect to this phenomenon, multiple studies have confirmed that wild populations around the world are dwindling and disappearing at an alarming rate. For example, the 2010 Global Biodiversity Outlook report found that the population of wild vertebrates living in the tropics dropped by 59 percent between 1970 and 2006.

The report also found that the population of farmland birds in Europe has dropped by 50 percent since 1980; bird populations in the grasslands of North America declined by almost 40 percent between 1968 and 2003; and the population of birds in North American arid lands has fallen by almost 30 percent since the 1960s. Similarly, 42 percent of all amphibian species (a type of vertebrate that is sometimes called an "ecological indicator") are undergoing population declines, and 23 percent of all plant species "are estimated to be threatened with extinction." Other studies have found that some 20 percent of all reptile species, 48 percent of the world's primates, and 50 percent of freshwater turtles are threatened. Underwater, about 10 percent of all coral reefs are now dead, and another 60 percent are in danger of dying.

Consistent with these data, the 2014 Living Planet Report shows that the global population of wild vertebrates dropped by 52 percent in only four decades—from 1970 to 2010. While biologists often avoid projecting historical trends into the future because of the complexity of ecological systems, it's tempting to extrapolate this figure to, say, the year 2050, which is four decades from 2010. As it happens, a 2006study published in Science does precisely this: It projects past trends of marine biodiversity loss into the 21st century, concluding that, unless significant changes are made to patterns of human activity, there will be virtually no more wild-caught seafood by 2048.

48% of the world's primates are threatened with extinction.

Catastrophic consequences for civilization.

The consequences of this rapid pruning of the evolutionary tree of life extend beyond the obvious. There could be surprising effects of biodiversity loss that scientists are unable to fully anticipate in advance. For example, prior research has shown that localized ecosystems can undergo abrupt and irreversible shifts when they reach a tipping point. According to a 2012 paper published in Nature, there are reasons for thinking that we may be approaching a tipping point of this sort in the global ecosystem, beyond which the consequences could be catastrophic for civilization.

As the authors write, **a planetary-scale transition could precipitate** "substantial losses of ecosystem services required to sustain the human population." An ecosystem service is any ecological process that benefits humanity, such as food production and crop pollination**. If the global ecosystem were to cross a tipping point and substantial ecosystem services were lost, the results could be "widespread social unrest, economic instability, and loss of human life." According to Missouri Botanical Garden ecologist Adam Smith, one of the paper's co-authors, this could occur in a matter of decades—far more quickly than most of the expected consequences of climate change, yet equally destructive.**

Biodiversity loss is a "threat multiplier" that, by pushing societies to the brink of collapse, will exacerbate existing conflicts and introduce entirely new struggles between state and non-state actors. Indeed, it could even fuel the rise of terrorism. (After all, climate change has been linked to the emergence of ISIS in Syria, and multiple high-ranking US officials, such as former US Defense Secretary Chuck Hageland CIA director John Brennan, have affirmed that climate change and terrorism are connected.)

The reality is that we are entering the sixth mass extinction in the 3.8-billion-year history of life on Earth, and the impact of this event could be felt by civilization "in as little as three human lifetimes," as the aforementioned 2012 Nature paper notes. Furthermore, the widespread decline of biological populations could plausibly initiate a dramatic transformation of the global ecosystem on an even faster timescale: perhaps a single human lifetime.

The unavoidable conclusion is that **biodiversity loss constitutes an existential threat** in its own right. As such, it ought to be considered alongside climate change and nuclear weapons as one of the most significant contemporary risks to human prosperity and survival.

China

Aff causes a shift to chemical and biological weapons – empirics and economic theory prove.

Horowitz et al 13 – University of Pennsylvania political science professor

[Michael, and Neil Narang, UC Santa Barbara political science, "Poor Man's Atomic Bomb? Exploring the Relationship between 'Weapons of Mass Destruction'," Journal of Conflict Resolution, 58.3, 2013, accessed 12-13-19]

The causes and consequences of nuclear proliferation have received a great deal of academic attention. However, nuclear weapons are rarely discussed in isolation in policy circles. Instead, nuclear weapons are relevant as part of a category of weapons of mass destruction (WMDs) that includes chemical and biological weapons (CBWs). Are the factors that drive CBWs proliferation similar to those that drive nuclear proliferation? What is the relationship between these weapons types? In this article, we explore whether nuclear weapons and CBWs serve as complements or substitutes. **Using newly collected data on** both **CBWs pursuit and possession over time, we find that n**uclear, biological, and chemical weapons generally function as complements at the pursuit stage. In addition, **countries that acquire nuclear weapons become less interested in pursuing other types of WMDs and are even willing to give them up in some cases.**

What motivates countries to pursue weapons of mass destruction (WMDs)?1 Despite a wave of research over the last several years on the spread of nuclear weapons and the consequences for international security, the spread of chemical and biological weapons (CBWs) remains relatively underexplored. In some ways, this makes sense—the West's concern with Iran's WMD development program is not driven by Iran's chemical or biological weapons programs. Instead, it is Iran's pursuit of nuclear weapons that propels international concern about the Iranian regime. On the other hand, policy makers worried a great deal about Saddam Hussein's CBWs arsenal before the Gulf War—especially after evidence surfaced of Saddam's usage of chemical weapons against the Kurdish population in Northern Iraq. **As the "poor man's** atomic **bomb," CBWs seem to be viewed by many countries as the best chance they have, short of nuclear weapons, at developing deadly weapons to protect themselves against their neighbors—or increase their ability to threaten them.**

In this article, **we present the first rigorous tests measuring the spread of CBWs**, focusing on both the pursuit of these systems and their implications. More important, **we focus on the interaction between bio**logical, chemical, **and nuclear weapons proliferation**, **evaluating the extent to which the pursuit or possession of one type of WMD influences the pursuit of another type** of WMD.

Do policy makers and military leaders treat nuclear, CBWs as substitutes or complements in their overall weapons arsenal? What is the actual relationship between nuclear, biological, and chemical weapons possession empirically? Does possessing a nuclear weapons program or capability increase or decrease the probability that a state will pursue biological or chemical weapons and vice versa? Finally, are the same factors known to be correlated with nuclear weapons proliferation also correlated with CBWs proliferation?

The answers to these questions are important for academics and policy makers. For example**, if the evidence suggests** that **leaders treat nuclear, bio**logical, **and chemical weapons capabilities as substitutes** in their strategic arsenal (perhaps **because each one is perceived to increase national security in a similar way), then analysts should adjust** their **assessments of proliferation risk downward for one capability conditional on observing another.** Conversely, if evidence suggests that leaders treat these weapons technologies as complements, then analysts should adjust their assessments of proliferation risk upward for any one technology upon observing another. Finally, **if** the evidence suggests that **leaders treat the three weapons capabilities as substitutes**, **then efforts to create a more robust nuclear n**on**p**roliferation **r**egime **could have the inadvertent consequence of increasing demand for CBWs capabilities**, **thus shifting prolif**eration **risk.**

Our results demonstrate three critical facets of the relationship between nuclear, biological, and chemical weapons proliferation. First, we find that many of the same security and economic factors that drive nuclear weapons proliferation also influence CBWs proliferation. Second, while we lack causal evidence, our statistical models support our argument that nuclear, biological, and chemical weapons generally function as complements at the pursuit stage. That is, countries that seek one of these weapons generally seek all three simultaneously. Third, there is some tentative evidence that **WMDs do function as substitutes in one important fashion**; **once countries acquire nuclear weapons, they become less interested in initiating pursuit of other types of WMDs and they are more likely to abandon other types of WMDs**. **This key finding provides an empirical basis for the notion that CBWs function as a "poor man's nuclear bomb," since possession of nuclear weapons appears to be systematically associated with a reduction in the demand for less powerful CBWs.**

Our link is specific and statistically sound

Horowitz et al 13 – University of Pennsylvania political science professor

[Michael, and Neil Narang, UC Santa Barbara political science, "Poor Man's Atomic Bomb? Exploring the Relationship between 'Weapons of Mass Destruction'," Journal of Conflict Resolution, 58.3, 2013, accessed 12-13-19]

Finally, we turn to estimating the effect of both nuclear and chemical weapons pursuit and acquisition on the risk of initiating biological weapons pursuit in models 5 and 6. These results are equally interesting because they provide support for the notion that **biological weapons** (in addition to chemical weapons) **can** also **be appropriately considered a "poor man's nuclear bomb."** Similar to the impact of possessing nuclear weapons on the probability a state pursues chemical weapons, **nuclear weapons possession has a strong negative effect on biological weapons pursuit** in both models 5 and 6. **After holding the underlying level of demand constant** in model 6, simply **possessing a nuclear weapon appears to decrease the instantaneous risk that a state will pursue biological weapons to virtually zero** (**1.44 x 10^-7**). **This is consistent with the understanding of nuclear weapons as so powerful that they make the possession of other types of WMDs less relevant**. Even before countries such as the United States abandoned their chemical weapons programs, for example, they abandoned their biological weapons program. **The United States eliminated its offensive BW program under a Nixon administration order in 1969** and had shut down the program by the time it signed the BWC in 1972. **France and Great Britain similarly eliminated their offensive BW programs**. Russia stands in stark contrast to this argument, however. Evidence revealed after the cold war demonstrated that the Soviet Union maintained a vibrant offensive BW program at the Biopreparat complex through the end of the cold war. This demonstrates that grouping CBWs into a single category may not accurately represent the way countries actually think about them. Biological weapons, given their greater theoretical destructive capacity, may be considered somewhat differently. This is a potential path for future research.

China has latent capability – nukes prevent development and usage

FAS n.d. "China: Chemical and Biological Weapons." Federation of American Scientists. https://fas.org/nuke/guide/china/cbw/ TG

China possesses an advanced biotechnology infrastructure as well as the requisite munitions production capabilities necessary to develop, produce and weaponize biological agents. Although **China has consistently claimed that it has**

never researched or produced biological weapons, it is nonetheless believed likely that it retains a biological warfare capability begun before acceding to the BWC. China is commonly considered to have an active biological warfare program, including dedicated research and development activities funded and supported by the Government for this purpose. There is essentially no open source data on the subject of Chinese BW activities, and **many legitimate research programs use similar, if not identical equipment and facilities.**

That causes extinction

Millett 17. Millett, Ph.D., Senior Research Fellow, Future of Humanity Institute, University of Oxford; and Snyder-Beattie, M.S., Director of Research, Future of Humanity Institute, University of Oxford. 08-01-2017. "Existential Risk and Cost-Effective Biosecurity," Health Security, 15(4), PubMed

In the decades to come, **advanced bioweapons could threaten human existence**. Al**though** the **probability** of human extinction from bioweapons **may be low, the expected value of reducing** the **risk could still be large, since** such **risks jeopardize** the existence of **all future generations**. We provide an overview of biotechnological extinction risk, make some rough initial estimates for how severe the risks might be, and compare the cost-effectiveness of reducing these extinction-level risks with existing biosecurity work. We find that reducing human extinction risk can be more cost-effective than reducing smaller-scale risks, even when using conservative estimates. This suggests that the risks are not low enough to ignore and that more ought to be done to prevent the worst-case scenarios. How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all future human lives. **Historically, disease events have been responsible for the greatest death tolls on humanity**. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world's population at the time.4 It is an open question whether **a future pandemic could result in outright human extinction or the irreversible collapse of civilization**. **A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity's favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens**.5,6 **While these arguments** point to a very small risk of human extinction, they **do not rule** the possibility **out** entirely. Although rare, there are recorded instances of **species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island**.7,8 **There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as**

the Massachusett (86% loss of population), **Quiripi-Unquachog** (95% loss of population), **and the Western Abenaki** (which suffered a staggering 98% loss of population).9 **In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently**. For example, **some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment**, such as rabies or septicemic plague. **Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu**,10 **and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population**.11,12 Under optimal virulence theory, **natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits**. **Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics**.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-21 **Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record ofstate-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature**. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.22 Delivery capabilities have also been subject to the cutting edge of technical development, with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology.23,24 While there is no evidence of state-run bioweapons programs directly attempting to develop or deploy bioweapons that would pose an existential risk, **the logic of deterrence and mutually assured destruction could create such incentives in more unstable political environments** or following a breakdown of the Biological Weapons Convention.25 **The possibility of a war between great powers could also increase the pressure to use such weapons—during the World Wars, bioweapons were used across multiple continents**, with Germany targeting animals in WWI,26 and Japan using plague to cause an epidemic in China during WWII.27

Indopak

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Both India and Pakistan have latent CBW capability – nukes prevent their development

Yamin 13 -- National Defence University Islamabad strategic and nuclear studies professor. [Tughral, "disaster like floods and earthquakes. Future disaster management policies should cover issues like CBW attacks. This should include inter alia training of first responders, including decon staff and medics, arranging for decontamination facilities, stocking hospitals with chem-bio vaccines, earmarking shelters, early warning sirens and public awareness through print and electronic media.," Policy Perspectives, 10.1, 2013, jstor, accessed 12-21-19]

CBWs in South Asia

Both India and Pakistan have the requisite human resource capital and well developed pharmaceutical **industry** to produce CW's. However, **both these South Asian countries chose to become part of the international treaties proscribing these weapons**. **The motivation** to do so **could have been** different for India and Pakistan. **India had made a long term investment in its nuclear programme**. It actually began before the partition, when Homi Bhabha established the Tata Institute of Fundamental Research (TIFR) in 1945. In 1974 India conducted its first nuclear test. In 1998 it carried out nuclear weapon tests. Pakistan followed suit. Pakistan has traditionally linked its security threats to India. It did not join the nuclear Non-Proliferation Treaty (NPT) because India chose to remain out of it. It is therefore understandable that Pakistan followed suit, when India opted for treaties banning BCW. India is an original signatory of the CWC and has also ratified the BWC. In 1992, Pakistan and India signed a Joint Declaration on the Complete Prohibition of CWs undertaking not to develop, produce, acquire or use these weapons. Both countries signed the CWC in 1993. Pakistan signed the Biological and Toxin Weapons Convention (BTWC) in 1972 and ratified it in 1974. According to a US State Department report "Available information did not suggest that any agent and toxin research activities by Pakistani entities were inconsistent with Pakistan's BWC obligations."25 After signing and ratifying the CWC in 1993, Pakistan has been regarded as a member in good standing of the OPCW.26 A number of inspections of pharmaceutical factories has revealed no violations.27 Pakistan remains firm in its commitment NOT to possess CBWs.

It came as a nasty surprise to Pakistan, when in June 1997, India acknowledged that it had a dedicated CW production programme. Pakistan decried India's declaration as a breach of the 1992 Joint Declaration, but nonetheless ratified the treaty later that year. It did not declare any chemical agent production facilities or stockpiles.28 Formal commitments notwithstanding, it is well known that India has the capability to produce a wide variety of chemical agent precursors at short notice should the government change its policy. According to Chinese researchers at one time India possessed upto 1,000 tons of CW agents, mostly mustard gas. These were stockpiled at five different locations. Under the terms of the CWC India was to destroy upto 45 per cent of its CW stocks by 2004 and the remaining by 2007.30 In 2009, India declared that it had destroyed its verifiable CW arsenal.31

Pakistan has never claimed possession of CBWs.32 Pakistani officials have time and again reiterated their country's commitments under CWC.33 This notwithstanding, there has been some propaganda against Pakistan with regards CW's in the past. Most of it has been conflicting, fragmentary and spread with malicious intent. Over the years Pakistan and India have accused each other of using CW's e.g. in May 1999 Pakistan blamed the Indians for using CW's in Siachin, and vice versa.34 In April 2003 Pakistan complained to the US about Indian forces using CW against the Kashmiri fighters.35 Indian military forces countered that the Kashmiris 'ultras' were in possession of CW's.36

In the wake of May 1998 nuclear tests, the US Department of Commerce imposed sanctions on a large number of entities related to nuclear and missile proliferation in India as well as Pakistan.37 The ban was lifted after the 9/11 attacks.38 No sanctions apply now. In 1999, the Pakistani government mandated all domestic chemical producers to "furnish details of the chemicals" imported or used in Pakistan.39 In October 2000, Islamabad promulgated the CWC Implementation Ordinance to prohibit the development, production, and use of CW in accordance with its obligations under the CWC. The law also prohibits the transport or transfer of chemical weapons or toxic dual-use chemicals and chemical agent precursors, as detailed in reports pursuant to UN Security Council Resolution 1540. The OPCW has conducted a number of inspections of industrial facilities in Pakistan engaged in the production of CWC-scheduled chemicals, and none of these have resulted in publicly known irregularities.40 Pakistan has played an active and consistent role in the OPCW, supporting provisions to increase trade and assistance in the peaceful uses of the chemical industry as consistent with the positions of the Non-Aligned Movement (NAM).41 Although the country's domestic chemical industry has continued to grow, Pakistan still relies on imports for many raw materials and intermediate chemicals. In 2010, Islamabad released the CWC (Implementation) Rules, which established requirements for all companies dealing with CWC-scheduled chemicals to make declarations, obtain permits, and receive inspections.42

Defensive Measures

Main problem with chemical agents is that there is no easy protection against these. On the battlefield, soldiers wear gas masks and complete skin coverings when a BCW attack is suspected. All Pakistan army combat troops are equipped with NBC protection suits and gas masks. Most formations have gas chambers to train soldiers to react to a gas attack. The medical units are well equipped to render emergency remedial aid to gas victim. The military also has limited decontamination capability. The civilian population is, however largely unprepared to respond to a chemical-biological attack. They need a supply of gas masks and water and airtight suits. This equipment is unfortunately not readily available to civilians. Some ways of protection against CBW attacks are by:

• Installing sensors in cities nationwide.43

• Stockpiling vaccines, including enough smallpox vaccine to vaccinate every person.

• Developing new drugs and vaccines.

• Writing emergency protocols for cities and hospitals

• Running drills of various attacks

It is indeed worth noting that India has constructed a number of nuclear shelters for its Prime Minister, the President, top army commanders and other select officials. Most bunkers are located in Delhi, Kashmir, Punjab, and Rajasthan. These include individual units of 30 sleeping bunks, their own power and water supplies, waste disposal, fire-fighting systems and decontamination modules. The shelters will provide safety in the event of a nuclear, chemical, or biological attack.44 Since 2004 India has established training programmes for their paramilitary forces such as the Indo-Tibetan border police and the Central Industrial Security Force to deal with nuclear, chemical, and biological disasters. The first course was for trainers and involved US experts.45 There is little worthwhile activities in this regard in Pakistan.

Conclusion

Chem-bio attacks in the future cannot be ruled out. Pakistanis prepared on two counts to handle such a situation. Firstly, the military is prepared to handle NBC fallouts on the battlefield and secondly, domestic authorities and diplomats posted in international arms control forums remain vigilant that Pakistan is not brought to account for suspected violations of existing treaties. The area, where the country needs to work is to prepare unsuspecting civilians to manage a situation arising from chemical or bio-warfare. The National Disaster Managemen Authority

That causes extinction

Millett 17. Millett, Ph.D., Senior Research Fellow, Future of Humanity Institute, University of Oxford; and Snyder-Beattie, M.S., Director of Research, Future of Humanity Institute, University of Oxford. 08-01-2017. “Existential Risk and Cost-Effective Biosecurity,” Health Security, 15(4), PubMed

In the decades to come, **advanced bioweapons could threaten human existence**. Al**though** the **probability** of human extinction from bioweapons **may be low, the expected value of reducing** the **risk could still be large, since** such **risks jeopardize** the existence of **all future generations**. We provide an overview of biotechnological extinction risk, make some rough initial estimates for how severe the risks might be, and compare the cost-effectiveness of reducing these extinction-level risks with existing biosecurity work. We find that reducing human extinction risk can be more cost-effective than reducing smaller-scale risks, even when using conservative estimates. This suggests that the risks are not low enough to ignore and that more ought to be done to prevent the worst-case scenarios. How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all future human lives. **Historically, disease events have been responsible for the greatest death tolls on humanity**. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world's population at the time.4 It is an open question whether **a future pandemic could result in outright human extinction or the irreversible collapse of civilization**. **A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity's favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens**.5,6 **While these arguments** point to a very small risk of human extinction, they **do not rule** the possibility **out** entirely. Although rare, there are recorded instances of **species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on**

Christmas Island.[7,8] There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and the Western Abenaki (which suffered a staggering 98% loss of population).[9] In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,[10] and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.[11,12] Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.[13-17] Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.[18] In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.[19-21] Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record ofstate-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.[22] Delivery capabilities have also been subject to the cutting edge of technical development, with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology.[23,24] While there is no evidence of state-run bioweapons programs directly attempting to develop or deploy bioweapons that would pose an existential risk, the logic of deterrence and mutually assured destruction could create such incentives in more unstable political environments or following a breakdown of the Biological Weapons Convention.[25] The possibility of a war between great powers could also increase the pressure to use such weapons—during the World Wars, bioweapons were used across multiple continents, with Germany targeting animals in WWI,[26] and Japan using plague to cause an epidemic in China during WWII.[27]

Israel

Aff causes a shift to chemical and biological weapons – empirics and economic theory prove.

Horowitz et al 13 – University of Pennsylvania political science professor

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The causes and consequences of nuclear proliferation have received a great deal of academic attention. However, nuclear weapons are rarely discussed in isolation in policy circles. Instead, nuclear weapons are relevant as part of a category of weapons of mass destruction (WMDs) that includes chemical and biological weapons (CBWs). Are the factors that drive CBWs proliferation similar to those that drive nuclear proliferation? What is the relationship between these weapons types? In this article, we explore whether nuclear weapons and CBWs serve as complements or substitutes. **Using newly collected data on** both **CBWs pursuit and possession over time, we find that n**uclear, biological, and chemical weapons generally function as complements at the pursuit stage. In addition, **countries that acquire nuclear weapons become less interested in pursuing other types of WMDs and are even willing to give them up in some cases.**

What motivates countries to pursue weapons of mass destruction (WMDs)?1 Despite a wave of research over the last several years on the spread of nuclear weapons and the consequences for international security, the spread of chemical and biological weapons (CBWs) remains relatively underexplored. In some ways, this makes sense—the West's concern with Iran's WMD development program is not driven by Iran's chemical or biological weapons programs. Instead, it is Iran's pursuit of nuclear weapons that propels international concern about the Iranian regime. On the other hand, policy makers worried a great deal about Saddam Hussein's CBWs arsenal before the Gulf War—especially after evidence surfaced of Saddam's usage of chemical weapons against the Kurdish population in Northern Iraq. **As the "poor man's** atomic **bomb," CBWs seem to be viewed by many countries as the best chance they have, short of nuclear weapons, at developing deadly weapons to protect themselves against their neighbors—or increase their ability to threaten them.**

In this article, **we present the first rigorous tests measuring the spread of CBWs**, focusing on both the pursuit of these systems and their implications. More important, **we focus on the interaction between bio**logical, chemical, **and nuclear weapons proliferation**, **evaluating the extent to which the pursuit or possession of one type of WMD influences the pursuit of another type** of WMD.

Do policy makers and military leaders treat nuclear, CBWs as substitutes or complements in their overall weapons arsenal? What is the actual relationship between nuclear, biological, and chemical weapons possession empirically? Does possessing a nuclear weapons program or capability increase or decrease the probability that a state will pursue biological or chemical weapons and vice versa? Finally, are the same factors known to be correlated with nuclear weapons proliferation also correlated with CBWs proliferation?

The answers to these questions are important for academics and policy makers. For example**, if the evidence suggests** that **leaders treat nuclear, bio**logical, **and chemical weapons capabilities as substitutes** in their strategic arsenal (perhaps **because each one is perceived to increase national security in a similar way), then analysts should adjust** their **assessments of proliferation risk downward for one capability conditional on observing another.** Conversely, if evidence suggests that leaders treat these weapons technologies as complements, then analysts should adjust their assessments of proliferation risk upward for any one technology upon observing another. Finally, **if** the evidence suggests that **leaders treat the three weapons capabilities as substitutes**, **then efforts to create a more robust nuclear n**on**p**roliferation **r**egime **could have the inadvertent consequence of increasing demand for CBWs capabilities**, **thus shifting prolif**eration **risk.**

Our results demonstrate three critical facets of the relationship between nuclear, biological, and chemical weapons proliferation. First, we find that many of the same security and economic factors that drive nuclear weapons proliferation also influence CBWs proliferation. Second, while we lack causal evidence, our statistical models support our argument that nuclear, biological, and chemical weapons generally function as complements at the pursuit stage. That is, countries that seek one of these weapons generally seek all three simultaneously. Third, there is some tentative evidence that **WMDs do function as substitutes in one important fashion**; **once countries acquire nuclear weapons, they become less interested in initiating pursuit of other types of WMDs and they are more likely to abandon other types of WMDs**. **This key finding provides an empirical basis for the notion that CBWs function as a "poor man's nuclear bomb," since possession of nuclear weapons appears to be systematically associated with a reduction in the demand for less powerful CBWs.**

Israel uniquely has breakout capacity but holds off cuz it has nukes

Garson 18 [Melanie Garson, teaching fellow in conflict resolution and intl security at University College London, PhD from UCL, MA in Law and Diplomacy, Post Grad Diploma in Law.] "Is it time for Israel to reveal the truth about its chemical weapons?" The Conversation. May 21, 2018. https://theconversation.com/is-it-time-for-israel-to-reveal-the-truth-about-its-chemical-weapons-95604 TG

The general consensus today is that **while there's little evidence that Israel maintains a chemical weapons stockpile, it retains "breakout capacity**" – that is, **it could readily mobilise its significant scientific and technological knowledge to restart its programme.**

A new world

Given its superiority in conventional weaponry and **nuclear capability, it seems unlikely that Israel would deploy chemical weapons** if it were attacked. However, as surrounding nations repeatedly cite this weapons capability as the reason they retain their own chemical weapons, the strategic value of an Israeli arsenal – current or potential – is clearly dubious.

Israel researches CBW and refuses to give up future development which proves the link

NTI 15. "Israel: Biological." Nuclear Threat Initiative. July 2015. https://www.nti.org/learn/countries/israel/biological/ TG

In keeping with Israel's policy of maintaining WMD ambiguity, **Israel "has never made a public policy statement on biological weapons (BW)" and is reluctant to participate in regional and international fora on WMD disarmament**. [1] Preferring to address disarmament and arms control in a regional context, **Israel has not signed the 1972 Biological and Toxin Weapons Conventions (BTWC)**, and believes that progress in advancing the treaty's goals in the region would require significantly improved political stability, discourse, and confidence building in the region. [2] However, Israel has taken steps to strengthen its export control regulations on dual-use biotechnologies and is also examining ways to improve security at sensitive Israeli laboratories. [3] **In terms of BW research, development, and deployment, Israel maintains reticence and ambiguity about its activities and capabilities.**

However, Israeli defensive **BW research regularly appears in open publications**. [4] The U.S. government offers conflicting assessments of Israel's BW activities. [5] Given the overall scarcity and ambiguity of official assessments and policy statements, reconstructions of Israel's BW history, status, and capabilities can provide only partial and interpretive depictions.

A precarious security environment and a strong science and technology foundation could provide motive and means for Israeli BW. However, the inherent characteristics of biological weapons limit their usefulness to Israel's military. Most notably, geographic proximity to Israel's likely state and sub-national adversaries, and the potential infection of Israel's own population as a "blowback" result, would introduce significant risk to any Israeli BW use. Additionally, Israeli military confrontations generally end within days or weeks, and biological weapons require longer incubation times. [6] Finally, biological attacks often resemble natural outbreaks and cannot be immediately identified as deliberate attacks. Some analysts have noted that **the very features diminishing the value of BW in state-to-state conflict may be advantageous in covert operations**. [7] Ultimately, **official ambiguity and reticence, the vibrant but secretive Israel Institute for Biological Research (IIBR), and a strong industrial biotechnology foundation continue to encourage speculation about the Israeli program** ranging "from the mundane to the fantastic." [8]

That causes extinction

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North Korean CBW capability and use is uniquely likely

Kazianis, MLA in IR at Harvard, '19 (Harry J., Senior Director of Korean Studies at the Center for the National Interest, https://nationalinterest.org/blog/korea-watch/us-invasion-north-korea-would-be-opening-gates-hell-57377, May 13) BW

Would the Trump administration actually consider invading North Korea? First of all, it goes without saying I hope this never happens. However, **history tells us we must plan for the worst.** So **what would military action against the DPRK look like?** While there are no certainties in modern warfare, **one thing is certain: an attack on North Korea** to rid the world of what can only be described as the most vile regime on the planet **could be an unmitigated disaster.** As I explained in a debate for the Week in 2014, there is four reasons a regime-change-style invasion of North Korea would be insane. **First, Kim has likely read a history book in the last twenty years:** Suppose Washington did decide **to dispose of the evil thugs in Pyongyang**. How would it proceed? It **would start by heavily bolstering the amount of military assets within striking distance** of North Korea. **This would involve bringing in multiple aircraft carrier battle groups, increasing the number of troops** in South Korea for a ground invasion, **moving in large amounts of land-based aircraft, and boosting missile defenses** in South Korea, Japan, and allied bases. In many respects, the U.S. would be dusting off an integral component of the 1991 Gulf War playbook — build a large attack force that can overwhelm the enemy. **Simple, right? The problem is that such a massive military mobilization can't be hidden. North Korea would instantly realize what was up. Pyongyang would certainly have a clear incentive to strike hard and fast knowing it constituted its best chance for survival. Here we see the great folly of Saddam Hussein: allowing coalition forces to build one of the world's most powerful fighting forces on his doorstep. Kim would realize his best chance** — maybe his only chance — **would be to strike with everything in his arsenal** at the first sign of a build-up. Second, North Korea would have every reason to launch a nuclear war: Why would a nation with less wealth than Ethiopia put billions of dollars into acquiring nuclear weapons? The answer is simple: to ensure that anyone considering imposing regime change won't take the risk. If Washington ever decided it was time to take the regime down, what reason would Pyongyang have from holding back? None. While there is debate whether Kim's missiles have the range or accuracy to hit the continental U.S., it does seem likely they could hit Seoul or Tokyo — one hell of an atomic parting gift. Kim knows all too well he would never be able to defeat an allied invasion — he may just decide to take as many souls down with him as possible. Third, **Kim might unleash his other weapons of mass destruction we all forget about**: **In a 2012 report on**

North Korea's military, the U.S. Department of Defense noted that "North Korea probably has had a longstanding chemical weapons (CW) program with the capability to produce nerve, blister, blood, and choking agents and likely possesses a CW stockpile. North Korea probably could employ CW agents by modifying a variety of conventional munitions, including artillery and ballistic missiles." Some **reports estimate that the regime could possess as much as 5,000 metric tons of chemical weapons. While opinions vary regarding North Korea's biological weapons capabilities, the same report sees such a program as a strong possibility, noting, "North Korea continues to research bacterial and viral biological agents that could support an offensive biological weapons program. Infrastructure, combined with its weapons industry, gives North Korea a potentially robust biological warfare capability." Imagining a nightmare scenario involving even a small cache of chemical or biological weapons is not hard.** A handful of such weapons launched at Seoul could create a panic not seen since the Sept. 11 terrorist attacks. **Even just one attack with such fearsome weapons on a civilian target must be avoided.**

North Korean biological weapons cause global catastrophe – no preparation – outweighs nuclear war

Donnelly 18 (John, award-winning investigative journalist and a sharp analyst of national security and politics, Roll Call, "The Other North Korean Threat: Chemical and Biological Weapons," https://www.rollcall.com/news/politics/the-other-north-korean-threat-chemical-and-biological-weapons, 6/12/2018, 7/6/2019)

Now that the Singapore summit of President Donald Trump and Kim Jong Un is in the rearview mirror, major questions remain, particularly about the part of North Korea's doomsday arsenal that Pyongyang's military is most likely to use in a war, one that **can potentially kill millions of people**, and one for which the U.S. military is woefully unprepared: **chemical and biological arms**. Nuclear weapons will continue to be the top concern. But they are far from the only one. Specifically, **U.S. forces in the region lack sufficient medical countermeasures, protective gear and technology to identify so-called chem-bio agents**, Pentagon insiders say. And the troops are insufficiently trained, manned and equipped for such a fight, according to previously unreported Pentagon audits and Army officials. Only about 1 in 3 of the Army's special units that deal with doomsday agents is fully prepared, the service confirmed. "We are definitely under-invested in countering North Korea's chemical and biological threats," said Andrew Weber, a former head of the Pentagon's chem-bio defense programs. U.S. capabilities are improving, he says, but "**we are playing catch-up, especially on the biological side**." The world recoiled this year at pictures of men, women and children choking on chemical gas in Syria, and an American-led coalition responded with airstrikes. Such scenes could play out a thousand times more in a potential chemical or biological war on the Korean Peninsula. If Kim were to unleash his suspected stockpile of smallpox, to name just one biological agent believed to be in his possession, it could bring back to the world perhaps the deadliest scourge in human history. "We need to accelerate our readiness efforts, because this is a serious issue," said House Armed Services Chairman Mac Thornberry, a Texas Republican, in a brief interview. Lethal Stockpile As for North Korea's chemical arsenal, U.S. intelligence officials have assessed for years that Pyongyang possesses a variety of agents — several thousand tons' worth — that its military can deliver via missiles, artillery, aerial bombs or by commandos on the ground. U.S. military bases in South Korea, with about 28,000 American troops, are in range of such an attack. So are some 200,000 U.S. citizens living in Seoul, South Korea's capital, as well as millions of South Korean military personnel and civilians. North Korea's missiles can reach Japan, where about 90,000 Americans are estimated to live, and the western Pacific island of Guam, where roughly 7,000 U.S. troops are stationed. North Korea's chemical agents include especially deadly ones like the nerve agent called VX, which Kim's assassins are understood to have used one year ago to kill his half-brother in Malaysia. The Malaysian incident raises the prospect of Kim potentially using chemical or biological weapons against U.S. targets in many parts of the world outside of Northeast Asia if the agent or its components are transportable. Another perilous chemical believed to be in North Korea's inventory is sarin, one ton of which can kill tens of thousands of people — and one of the agents Syrian President Bashar Assad is suspected of using against his own people, including in the town of Douma in April.

Biological Terrors **North Korea's biological arsenal**, meanwhile, **is shrouded in more mystery than its chemicals.** Pyongyang is believed to possess at least 13 different biological warfare agents, experts say, but how extensively North Korea has weaponized them, if at all, is unclear. The inventory may include botulism, cholera, hemorrhagic fever, plague, typhoid and yellow fever, U.S. officials say. But anthrax and smallpox are the two biological agents that U.S. officials are most confident North Korea possesses. One of the four North Korean defectors who fled south last year had antibodies to anthrax in his system, according to press reports in South Korea. The South Korean government assessed in 2015 that some of North Korea's biological agents could be weaponized in 10 days. Of course, U.S. intelligence has been wrong about weapons of mass destruction before, so all assessments should be viewed skeptically. Still, if only a fraction of the unclassified intelligence reports on North Korea's chem-bio capabilities are true, it is still cause for concern. Kim's Incentive If war erupted or even appeared imminent, Kim would be more likely to use biological weapons than chemical ones, and nuclear arms would be his last resort, says Weber, the former Pentagon official. The reasons are manifold. **The North Korean military views chem-bio agents as regular weapons of war,** not as arms that are beyond the pale, analysts say. In addition, the North Koreans might think, correctly or not, that the United States would see a chem-bio attack as less severe than a nuclear one and therefore less likely to trigger an all-out U.S. military response. What's more, North Korea could deploy biological agents stealthily, perhaps by commandos on the ground, in a pre-war phase before a full-scale conflict erupted. A bio attack could sow panic on U.S. bases or among civilians in South Korea or Japan and could disrupt the logistics of U.S. or allied forces. Biological weapons might have another perceived advantage for Kim. It might not be immediately clear that a weapon had been deployed at all, as reported symptoms could be confused for a naturally occurring incidence of disease. And if the outbreak was deemed to be man-made, assuming such a determination can be made, it might be difficult or impossible to prove who caused it. **Once the shooting would begin in a war on the Korean Peninsula, there is little reason to think Kim would hesitate to use every capability at his command** — **including chem-bio agents**. After all, he is said to have killed his own family members. While he would have an interest in protecting the lives of enough of his own troops to defend his regime, he might also be willing to sacrifice some of those soldiers, and many of them might be willing to be sacrificed, says Bruce Bennett, an expert on North Korea at RAND Corp., a think tank that gets some of its funding from the Pentagon. In the event of an all-out war, Kim might be forced to use chemical and biological weapons simply because he lacks sufficient conventional power and does not have enough nuclear weapons to hit all the targets he will need to take out, Bennett says. If a military conflict were imminent or had begun, U.S. forces would try to take out North Korea's chem-bio arsenal as soon as possible, even pre-emptively. But they might not have enough intelligence on where those agents are hidden, nor the ability to destroy them if they are deeply buried. Plus, there is the risk that **a U.S. strike could disseminate lethal toxins that could endanger innocent Koreans or U.S. personnel**. Shortfalls in Protection Defense Department public affairs personnel say they are sparing no effort to prepare for such weapons. "In light of the increased level of rhetoric and provocations coming from North Korea, there continues to be emphasis on CBRN [chemical, biological, radiological and nuclear] defense readiness in both Peninsula-based units as well as those units identified for possible deployment to the KTO [Korean Theater of Operations] in the event of hostilities," said U.S. Forces Korea in a statement. The emphasis may be coming too late, many experts worry. **For the U.S. armed forces, a chemical or biological attack would be a nightmare scenario** for a number of reasons. Military equipment must be decontaminated, and protective gear (for people, weapons and vehicles) must be put in place — all while revving up for a military response. Once it is clear that an attack has occurred, the challenge would immediately be determining what the agent was and responding medically to a potentially large number of affected personnel, assuming it is not too late to treat them. Anthrax and smallpox are the only two biological agents that U.S. troops in South Korea are known to be vaccinated against, a fact well-known to North Korea. Moreover, the medical tools needed to treat people affected by biological agents are lacking. "For a number of agents, we have no medical response capability other than basic medical care," says Weber, the former Pentagon chief of chem-bio defense. In some biological warfare scenarios, the symptoms show up long after the dispersal. And by the time people realize they have been hit, the usefulness of protective gear is diminished. What's more, U.S. forces probably do not have enough of that gear anyway. The charcoal-lined protective suits set aside for chem-bio scenarios only last 24 hours after exposure and then must be replaced. That means multiple sets are needed for each of the 28,000 U.S. military personnel in South Korea alone. "If you are going to get into a serious chemical environment, you are going to have to have lots of suits per person, and we are not there," says Bennett of RAND. If the North Koreans do have smallpox and if they used it, **a lethal outbreak might spread widely.** Smallpox is said to have killed at least 300 million people in the 20th century alone before being eradicated in the 1970s. The lone surviving samples of the virus were supposed to be in the then-Soviet Union and the United States. But North Korea may have obtained some. **A re-release of that scourge into the world would be "a global catastrophe,"** Weber says. "**It would spread like wildfire**." 'Not Well-Prepared' The U.S. military itself has called into question its units' readiness to respond to a chem-bio crisis on the Korean Peninsula. First, the Army's 5,000-soldier force that specializes in responding to chemical, biological, radiological or nuclear (CBRN) weapons is not sufficiently prepared, the service confirms. In fact, only about 1 in 3 of the 130 units is rated as fully ready, with enough equipment, training and people, the Army says. Until recently, training for such missions "was set at a lesser priority resulting in associated skill atrophy and reduced readiness of both maneuver and CBRN forces' ability to operate in a contaminated environment," Wayne Hall, an Army spokesman, said in a statement. Guy Roberts, the Pentagon's assistant secretary for nuclear, chemical and biological defense programs, told a Senate panel last November he is "very much worried" about its biological weapons. "Frankly," Roberts said, "I think **this is one area we really are not well-prepared to deal with.** And that's one of the things that, if confirmed, I plan on addressing very strongly." Training Gaps Pentagon audit reports paint a disturbing picture of the preparedness of U.S. forces for chem-bio war in Asia and beyond. In an originally secret 2015 report, the Pentagon inspector general, or IG, found that masks, protective suits, gloves and boots were not present in some units, and had not been adequately inspected in others. An unclassified summary of the 2015 report was released last year. It said U.S. military units in South Korea "were not issued all required individual protective equipment to defend against chemical and biological agents. Further, U.S. forces were not performing required protective mask maintenance checks and services, maintaining serviceable individual protective equipment, or properly storing individual protective equipment. … Without sufficient quantities of personal protective equipment, personnel are at risk in a contaminated environment." Two years ago, yet another IG report disclosed that most audited Army and Marine Corps units in South Korea had failed to train as collective units to perform their missions in the event of chem-bio warfare. Individual soldiers in one Army brigade had rehearsed functions such as putting on masks and suits and, prior to deploying to South Korea, had incorporated chem-bio tasks in its

training as a unit, the IG acknowledged. However, once deployed to South Korea, fully 18 of 19 of the brigade's units, plus another Marine Corps unit that was audited, had not trained to perform their missions collectively as if in a toxic environment, even though that is a military requirement, the IG found. "If not corrected, the CB [chem-bio] deficiencies discussed in this report increase the risk that U.S. forces stationed in the ROK [Republic of Korea] may not be able to conduct their missions in a wartime environment," the auditors wrote. Asked about the report, U.S. Forces Korea officials said recently that Army and Marine Corps units are making sure they conduct the required chem-bio training, which they called "the top training priority." The Pentagon inspector general, though, is withholding judgment for now. "The only way to verify recommended actions have been taken is through a follow-up audit," said Bruce Anderson, a spokesman for the inspector general, in a statement. The U.S. shortfalls may not matter in the end, as long as Trump and Kim reach a deal on North Korea's nuclear weapons in the weeks ahead. Such an accord would reduce the chances for war on the peninsula, even if the arrangement would not limit Kim's chem-bio arsenal or his missile inventory. However, a successful completion of the talks — and a successful implementation of any agreement — would be a historical aberration. Three U.S. presidents have reached deals with North Korea since 1994, only to see them fall apart later as both sides hurled recriminations. If these new talks also crumble, it will restart war preparations. **And if war comes, it is more likely to at least begin with a different sort of doomsday weapon than the nuclear kind that the world is now focused on.**

North Korean bioweapons cause extinction

Baumgaertner & Broad 19 (Emily, science and medicine reporter at the Los Angeles Times, William, two-time Pulitzer Prize winning science journalist and senior writer, New York Times, "North Korea's Less-Known Military Threat: Biological Weapons," https://www.nytimes.com/2019/01/15/science/north-korea-biological-weapons.html, 1/15/2019, 7/6/2019)

WASHINGTON — Pound for pound, **the deadliest arms of all time are not nuclear but biological. A single gallon of anthrax,** if suitably distributed, **could end human life on Earth**. Even so, the Trump administration has given scant attention to North Korea's pursuit of living weapons — a threat that analysts describe as more immediate than its nuclear arms, which Pyongyang and Washington have been discussing for more than six months. According to an analysis issued by the Middlebury Institute of International Studies at Monterey last month, North Korea is collaborating with foreign researchers to learn biotechnology skills and build machinery. As a result, **the country's capabilities are increasing rapidly**. "North Korea is far more likely to use biological weapons than nuclear ones," said Andrew C. Weber, a Pentagon official in charge of nuclear, chemical and biological defense programs under President Obama. "**The program is advanced, underestimated and highly lethal**." The North may want to threaten a devastating germ counterattack as a way of warding off aggressors. If so, its bioweapons would act as a potent deterrent. But experts also worry about offensive strikes and agents of unusual lethality, especially the smallpox virus, which spreads person-to-person and kills a third of its victims. Experts have long suspected that the North harbors the germ, which in 1980 was declared eradicated from human populations. Worse, analysts say, satellite images and internet scrutiny of the North suggest that Pyongyang is newly interested in biotechnology and germ advances. In 2015, state media showed Kim Jong-un, the nation's leader, touring a biological plant, echoing his nuclear propaganda. But compared to traditional weapons, biological threats have a host of unsettling distinctions: **Germ production is small-scale and far less expensive than creating nuclear arms.** Deadly microbes can look like harmless components of vaccine and agricultural work. And living weapons are hard to detect, trace and contain. The North's great secrecy makes it hard to assess the threat and the country's degree of sophistication. Today, the North might well have no bioweapons at all — just research, prototypes, human testing, and the ability to rush into industrial production. Still, Anthony H. Cordesman, a former Pentagon intelligence official now at the Center for Strategic and International Studies, said the North "has made major strides" in all technical areas needed for the production of a major germ arsenal. In unclassified reports, the Trump administration has alluded to the North's bioweapons program in vague terms. President Trump did not broach the subject of biological weapons during his meeting with Mr. Kim in Singapore, according to American officials. The lack of detail and urgency is all the more surprising given that John R. Bolton, Mr. Trump's national security adviser, has long described it as a regional and even a global threat. In 2002, as under secretary of state for arms control and international security in the George W. Bush administration, Mr. Bolton declared that "North Korea has one of the most robust offensive bioweapons programs on Earth." Last century, most nations that made biological arms gave them up as impractical. **Capricious winds could carry deadly agents back on users, infecting troops and citizens.** The United States renounced its arsenal in 1969. But today, analysts say, the **gene revolution could be making germ weapons more attractive.** They see the possibility of designer pathogens that spread faster, infect more people, resist treatment, and offer better targeting and containment. If so, North Korea may be in the forefront. South Korean military white papers have identified at least ten facilities in the North that could be involved in the research and production of more than a dozen biological agents, including those that cause the plague and hemorrhagic fevers. United States intelligence officials have not publicly endorsed those findings. But many experts say the technological hurdles to such advances have collapsed. The North, for instance, has received advanced microbiology training from institutions in Asia and Europe. Bruce Bennett, a defense researcher at the RAND Corporation, said defectors from the North have described witnessing the testing of biological agents on political prisoners. Several North Korean military defectors have tested positive for smallpox antibodies, suggesting they were either exposed to the deadly virus or vaccinated against it, according to a report by Harvard Kennedy School's Belfer Center for Science and International Affairs. Smallpox claimed up to a half billion lives before it was declared eradicated. Today, **few populations are vaccinated against the defunct virus**. Starting three years ago, Amplyfi, a strategic intelligence firm, detected a **dramatic increase in North Korean web searches for "antibiotic resistance," "microbial dark matter," "cas protein" and similar esoteric terms**, hinting at a growing interest in advanced gene and germ research. According to the Middlebury Institute analysis, at least 100 research publications that were jointly written by North Korean and foreign scientists have implications for military purposes, such as developing weapons of mass destruction. The collaborations may violate international sanctions. Joseph S. Bermudez, Jr., a North Korean military analyst, said it is entirely likely that the North has already experimented with gene editing that could enhance bacteria and viruses. "These are scientists, and scientists love to tinker," he said. Western concerns about the North's program jumped in June 2015, after Mr. Kim posed in a white lab coat alongside military officers and

scientists in a modern-looking pesticide facility called the Bio-Technical Institute, his arms outspread toward shiny lab equipment. The plant allegedly produced pesticides. The photos showed enormous fermenters for growing microbes, as well as spray dryers that can turn bacterial spores into a powder fine enough to be inhaled. Mr. Kim was beaming. Melissa Hanham, a scholar who first identified the site's threatening potential, said equipment model numbers showed that the North had obtained the machinery by evading sanctions — laundering money, creating front companies or bribing people to buy it on the black market. She said the evidence suggests the North succeeded in building a seemingly harmless agricultural plant that could be repurposed within weeks to produce dried anthrax spores. Arms-control analysts say intrusive inspections are needed to see whether a facility is intended for peaceful aims or something else. "A nuclear weapons facility has very visible signals to the outside world," Mr. Bermudez said. "We can look at it and immediately say, 'Ugh, that's a nuclear reactor.' But **the technology for conducting biological weapons research is essentially the same as what keeps a population healthy**." Americans felt the sting of bioweapons in 2001 when a teaspoon of anthrax powder, dispatched in a handful of envelopes, killed five people, sickened 17 more and set off a nationwide panic. The spores shut down Congressional offices, the Supreme Court and much of the postal system, and cost about $320 million to clean up. Federal budgets for biodefense soared after the attacks but have declined in recent years. "The level of resources going against this is pitiful," said Mr. Weber, the former Pentagon official. "We are back into complacency." Dr. Robert Kadlec, the assistant secretary for preparedness and response at the Department of Health and Human Services, said, "We don't spend half of an aircraft carrier on our preparedness for deliberate or natural events." The National Security Council's top health security position was eliminated last year, so biological threats now come under the more general heading of weapons of mass destruction. Still, on the Korean Peninsula, troops gird for a North Korean attack. According to the Belfer report, American forces in Korea since 2004 have been vaccinated against smallpox and anthrax. Recently, Army engineers sped up the detection of biological agents from days to hours through Project Jupitr, or the Joint United States Forces Korea Portal and Integrated Threat Recognition, a Department of Defense spokeswoman said. The comptroller general of the United States, after a request from the House Armed Services Committee, is currently conducting an evaluation of military preparedness for germ attacks. "If **you're a country that feels generally outclassed in conventional weapons**," Ms. Hanham said, **a lethal microbe such as anthrax might seem like a good way "to create an outsized amount of damage." Such an attack would maximize casualties**, she said, while terrorizing the uninfected population. For North Korea, Ms. Hanham added, "That would be the twofold goal."

2NR

O/V

Elimination of nuclear weapons leaves a military hole that has to be filled or countries face risk of ruining military strength. Eliminating nukes leads to a shift to chemical and biological weapons- decades of empirics and economic theory prove - that lowers the threshold for use of WMD and makes any conflict existential through self-replicating pathogens that cause extinction.

[Optional lol] Framing issue- try or die flips neg – it's a shift disad – every function nuclear weapons serve in the status quo would shift to CBW so there's no reason to vote aff

Impact O/V Short

CBW turns and o/w case-

A] Magnitude – bioweapons cause extinction – billions of people die as the disease spreads worldwide – impact D is wrong cuz they can add multiple diseases to one weapon or bioengineer the worst attributes into 1 disease which enhances things like transmission, lethality, and resistance. Pathogens are self-replicating and have wide host ranges which makes even small arsenals exponentially deadly and means diseases have large target populations over huge areas.

B] Probability – 1 – attribution issues – they don't know who it came from which increases chance of covert usage while nukes are trackable thru arc calculations – 2 – no taboo – countries know nukes are big bad which is proven by de-escalation of the Cuban Missile Crisis but nothing similar for bioweapons

C] Timeframe – nukes would just incinerate some people and we can go back which is proven by Hiroshima and Nagasaki but bioweapons would render whole areas hazardous and uninhabitable

D] Turns case – increased CBW means other countries without nukes right now i.e. Saudi Arabia, Iran, Turkey would develop nukes to be more powerful and deter bioattacks which triggers all of their nuke war impacts cuz these countries are led by unstable dictators and are prone to nuclear terror cuz of low security

Impact O/V Long

A] That outweighs the case on probability -we're winning the IL link to the actual use of bioweapons that outweighs the likelihood of nuclear use – if we win any of these arguments you can't vote aff.

1] no taboo- countries know nukes are apocalyptic which is proven by the Cuban Missile Crisis de-escalation but the same isn't true for bioweapons because it's a new field and capabilities are kept on the down low and asymmetric which means not even the host country could know the devastating potential of a weapon

2] covert- bioweapons can be used discretely by putting anthrax in the other countries water which allows them to not face punishment from allies or the international community because it can't be proven who launched while nukes are trace-able through arc calculations

3] independently- the process of arms racing to create bioweapons at a faster rate than other nations leads to instability that makes lab accidents inevitable and uniquely leads to extinction- it only takes one deadly super spreader to cause a pandemic and safety measures are gone we countries are trying to militarily out-innovate each other

Bioweapons development causes lab accidents which cause extinction

- One off errors are hard to predict – 80% of them are due to human error
- Pathogens can be inactivated incompletely – empirically proven – the DOD accidentally sent live anthrax to 200 labs

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Incidents causing potential exposures to pathogens occur frequently in the high security laboratories often known by their acronyms, **BSL3** (Biosafety Level 3) **and BSL4 Lab incidents that lead to undetected or unreported lab**oratory-acquired infections **can lead to** the release of a **disease** into the community **outside the lab**; lab workers with such infections will leave work carrying the pathogen with them. If the agent involved were a potential pandemic pathogen, **such a community release could lead to a worldwide pandemic with many fatalities**. Of greatest concern is **a release of a lab-created, mammalian-airborne-transmissible, highly pathogenic avian influenza virus, such as** the airborne-transmissible **H5N1 viruses** created in the laboratories of Ron Fouchier in the Netherlands and Yoshihiro Kawaoka In Madison Wisconsin. Such **releases are fairly likely over time, as there are at least 14 labs** (mostly in Asia) now carrying out this research. **Whatever release probability the world**

is gambling with, it is clearly far too high a risk to human lives. Mammal-transmissible bird flu research poses a real danger of a worldwide pandemic that could kill human beings on a vast scale. Human error is the main cause of potential exposures of lab workers to pathogens Statistical data from two sources show that human error was the cause of, according to my research, 67 percent and 79.3 percent of incidents leading to potential exposures in BSL3 labs. These percentages come from analysis of years of incident data from the Federal Select Agent Program (FSAP) and from the National Institutes of Health (NIH). (Details may be found in the Supplementary Material document.) Understanding human error is important to calculating the probability that a pathogen will be released from a lab into the surrounding community, the first step in calculating the likelihood of a pandemic. A key observation is that human error in the lab is mostly independent of pathogen type and biosafety level. Analyzing the likelihood of release from laboratories researching less virulent or transmissible pathogens therefore can serve as a reasonable surrogate for how potential pandemic pathogens are handled. (We are forced to deal with surrogate data because, thank goodness, there are little data on the release of potentially pandemic agents.) Put another way, surrogate data allows us to determine with confidence the probability of release of a potentially pandemic pathogen into the community. In a 2015 publication, Fouchier describes the careful design of his BSL3+ laboratory in Rotterdam and its standard operating procedures, which he contends should increase biosafety and reduce human error. Most of Fouchier's discussion, however, addresses mechanical systems in the laboratory. But the high percentage of human error reported here calls into question claims that state-of-the-art design of BSL3, BSL3+ (augmented BSL3), and BSL4 labs will prevent the release of dangerous pathogens. How much lab-worker training might reduce human error and undetected or unreported laboratory acquired infections remains an open question. Given the many ways by which human error can occur, it is doubtful that Fouchier's human-error-prevention measures can eliminate release of airborne-transmissible avian flu into the community through undetected or unreported lab infections. Human-error incident data. In its 2016 study for the NIH, "Risk and Benefit Analysis of Gain of Function Research," Gryphon Scientific looked to the transportation, chemical, and nuclear sectors to define types of human error and their probabilities. As Gryphon summarized in its findings, the three types of human error are skill-based (errors involving motor skills involving little thought), rule-based (errors in following instructions or set procedures accidentally or purposely), and knowledge-based (errors stemming from a lack of knowledge or a wrong judgment call based on lack of experience). Gryphon claimed that "no comprehensive Human Reliability Analysis (HRA) study has yet been completed for a biological laboratory… . This lack of data required finding suitable proxies for accidents in other fields." But mandatory incident reporting to FSAP and NIH actually does provide sufficient data to quantify human error in BSL3 biocontainment labs. Federal Select Agent Program incident data. FSAP incident data were collected from summary reports to Congress for the years 2009 through 2015. Three of the seven FSAP incident categories involve skill-based errors: 1) needle sticks and other through the skin exposures from sharp objects, 2) dropped containers or spills/splashes of liquids containing pathogens, and 3) bites or scratches from infected animals. Some skill errors, such as spills and needle sticks could be reduced with simple fixes (see below). The rule-based and knowledge-based incident categories are: 4) pathogens manipulated outside of a biosafety cabinet or other equipment designed to protect exposures to infectious aerosols; 5) potential exposures resulting from non-adherence to safety procedures or deviations from lab standard operating procedures, and 6) failure or problem with personal protective equipment–a mix of skill, rule, or knowledge-based errors. The seventh category is mechanical or equipment failure, or defective labware. Another category not mentioned in the FSAP reports is failure to properly inactivate pathogens before transferring them to a lower biosafety level lab for further research. During the 2009-2015 time period, FSAP received a total of 749 incident reports from select-agent research facilities. Conservatively, 594 or 79.3 percent of those incidents involve human error (Details may be found in the Supplementary Material.) National Institutes of Health incident data. Incident reports to the NIH Office of Science Policy cover the period from 2004 through 2017 and BSL3 and BSL4 facilities. They were obtained through a Freedom of Information Act request. There were no reported incidents from BSL4 facilities. Reporting to NIH is required only for incidents involving pathogens that contain recombinant DNA. While it is highly likely there have been incidents in BSL4 facilities, they may not have involved pathogens with recombinant DNA and so would not show up in the reports to NIH. The 128 incident reports provide extremely detailed descriptions. The reports are often several-dozen pages long so almost no questions remain about details. Of the 128 incidents, 86 or 67.2 percent were due to human error. This percentage is in the same ballpark as the FSAP reports. Some human errors are "one-off," meaning they happened once and likely won't happen again One-off errors are difficult to anticipate, so it is unlikely that one can devise meaningful changes in standard operating procedures to prevent them Here is one example of a one-off error, slightly modified from an incident report: A researcher was exchanging two plastic 24-well plates in the tabletop Sorvall centrifuge. While closing the lid, it was caught on a centrifuge wrench which was accidentally placed into the path of the lid. The wrench jumped and knocked one of the removed 24-well plates onto the counter. The plate landed at approximately a 45-degree angle and lost approximately half its contents to the bench top. For some errors, there are procedural changes that should reduce their frequency. For instance, needle sticks can occur from syringes with sharp metal needles when being used to transfer liquids from one small container to another. For injecting animals, sharp metal needles are needed; but for liquid transfers, blunt-plastic needles would suffice. Also, dropping items could sometimes be prevented using lab carts to transport items from place to place, rather than carrying them by hand. Here are three comments from the aforementioned Fouchier publication. "Only authorized and experienced personnel that have received extensive training can access the facility." "All personnel have been instructed and trained how to act in case of incidents." "For animal handling, personnel always work in pairs to reduce the chance of human error." The first two bullets speak to standard training of lab workers who work with particularly dangerous pathogens. It is unclear whether the diligent training of lab workers he outlines would substantially reduce human error: The entities reporting incidents to NIH mention similar diligent training; nonetheless, undetected or unreported laboratory acquired infections occur with high frequency in these laboratories Furthermore, it is unclear whether other laboratories creating and researching airborne-transmissible diseases are so carefully designed and diligent in their training. The two-person rule for animal handling is a good idea that is not typically mentioned in the detailed NIH incident reports. Animal bites and needle punctures brought about by unruly lab animals are not uncommon. Release from high biocontainment through incomplete inactivation. Beyond the aforementioned undetected or unreported laboratory-acquired infections lies another route by which pathogens can be released from high biosecure level labs—incomplete inactivation. Inactivation is designed to destroy the pathogenicity of an infectious agent, while retaining its other characteristics for research in which live pathogens are not needed. Since there are reliable inactivation procedures, failure to inactivate is a human error. Pathogens are inactivated for research that can be performed in lower BSL2 biocontainment, where it is much easier to carry out. Research in BSL3 and BSL4 laboratories is difficult, both because of restricted movement in the personal protective equipment that must be worn and because of restrictions in operating procedures that aim to minimize potential exposure to pathogens. While incomplete inactivation does not usually directly cause a release into the community, researchers in BSL2 labs are at a much higher risk of infection, and their street clothes, hair, and skin can become contaminated. But incomplete inactivation is a route to potential release

into the community. The FSAP does not routinely collect data on incomplete inactivation, and it seems no one else does either. Thus, enough data to calculate probabilities for this type of incident are not available. But the Government Accountability Office (GAO) has weighed in on the issue. The GAO reports anecdotal evidence and some numbers on incomplete inactivation to support the contention that it is a serious issue. The office has identified 11 incidents, in addition to 10 incidents already identified by the FSAP. Notably, two of the incidents involved Ebola and Marburg viruses, which because of a lack of countermeasures (vaccines and antivirals) are researched at BSL4 facilities. Among other things, the GAO report called attention to a well-publicized incident in which **a Defense Department laboratory "inadvertently sent live Bacillus anthracis, the bacterium that causes anthrax, to almost 200 laboratories worldwide over the course of 12 years** The **lab**oratory **believed that the samples had been inactivated."** The report describes yet **another well-publicized incident in China in which "two researchers conducting virus research were exposed to** severe acute respiratory syndrome (**SARS**) coronavirus samples that were incompletely inactivated. The **researchers subsequently transmitted SARS to others** leading to several infections and one death in 2004." The GAO identified three recent releases of Ebola and Marburg viruses from BSL4 to lower containment labs due to incomplete inactivation. **A fourth release in 2014 from the CDC labs occurred when "Scientists inadvertently switched samples designated for** live **Ebola** virus studies **with samples intended for studies with inactivated material** As a result, the samples with viable Ebola virus, instead of the samples with inactivated Ebola virus, were transferred out of a BSL-4 laboratory to a laboratory with a lower safety level for additional analysis. While no one contracted Ebola virus in this instance, the **consequences could have been dire** for the personnel involved as there are currently no approved treatments or vaccines for this virus." The CDC has issued a report on this mixup, and the steps they have taken to avoid this particular error in the future. All these incidents confirm the role of incomplete inactivation that would lead to an increased likelihood of release into the community from a BSL2 lab. **These are all human errors, some involving BSL4 pathogens.** Along with the observation that other human errors are the cause of more than two-thirds of potential exposures in BSL3 labs, **it is clear that state-of-the-art laboratory design will not prevent release into the community.**

4] Nuke war is mutually assured destruction because radiation and fallout would kill everyone, especially if they are right about nuclear winter- it's possible to biologically attack another nation and protect your own people- countries could give vaccines to only their citizens and they'd get off free

5] NFU and treaties all prevent the use of nuke weapons but countries have been slacking on the threat of bioweapons which means there are less safe guards and more likely to be used

B] It outweighs on magnitude – bioweapons cause extinction – pathogens are self-replicating and have interspecies hosts which makes even small arsenals exponentially deadly - new advancements allow diseases to target the entire world – nuclear fallout is limited to certain geographical areas so humans can just live elsewhere and its reversible. pathogens don't even need a human host to spread so once they are in the environment they can go attach themselves to anything

C] Scope -new pathogens can't be stopped and mutations means it can kill entire species, resisting immunities –there can be no magical 1 and done cute because diseases cross contaminate and form new viruses to be researched. In an interconnected global economy it only only takes days to spread.

The DA turns case-

1] Bioweapons development means non-nuclear countries like Saudi Arabia, Iran, and Turkey would develop nukes to be more powerful and deter bioattacks which triggers all of their nuke war impacts but worse since they'll be in arms races which are inherently unstable- that leads to draw in and makes nuke war inev.

2] Disease is a conflict magnifier for instability – it makes global conflict more likely for resources and ambiguity allows scapegoating that leads to war

Impact O/V Food Add-On

Countries can wage war by devastating an enemy nation's food supply by releasing an engineered pathogen- Biological weapons crush food by attaching to agriculture and livestock and mutating- destructive pathogens are gene-edited which means they are immune to countermeasures and new tech makes implanting on plants easy

[Nuke draw in impact] Food insecurity is the likeliest flashpoint for extinction- empirical examples prove it's the greatest cause of conflict which leads to nuclear draw in and turns the case and outweighs on scope because all gret powers engage in war rather than just the scenario they've isolated

Impact O/V Biodiversity Add-on

Engineered pathogens attach to livestock and agriculture which leads to mass species extinction- no one can tell the symptoms are the result of a bioweapons which makes containment and countermeasures impossible.

Turns and O/W Nuke Terror

1] Terrorists can steal from countries even if they don't have the ability to develop weapons themselves – proven by them stealing enriched uranium in the past

2] Bioweapons are easier than nukes for nonstate actors to acquire, make, and use- the difference is huge

Arnold 08

Sci Tech 5/28/2008 at 13:46:03 Einstein's Warning: a bioterrorist pandemic worse than a nuclear explosion By Brad Arnold https://www.opednews.com/articles/life_a_brad_arn_080528_einstein_s_warning_3a_.htm ///qlsms

Richard Danzig, a former Navy secretary and now a biowarfare consultant to the Pentagon, said that while there are 1,000 to 10,000 "weaponeers" worldwide with experience working on biological arms, there are more than 1 million and perhaps many millions of "broadly skilled" scientists who, while lacking training in that narrow field, could construct bioweapons. "It seems likely that, over a period between a few months and a few years, broadly skilled individuals equipped with modest laboratory equipment can develop biological weapons," Danzig said. "Only a thin wall of terrorist ignorance and inexperience now protects us." --Washington Post, December 29, 2004

This letter to you is like the letter Dr. Albert Einstein wrote United States President Franklin D. Roosevelt on August 2, 1939.

Dr. Einstein wrote, "...it may become possible to set up a nuclear chain reaction in a large quantity of uranium...," and "...it is conceivable...that extremely powerful bombs of a new type may thus be constructed."

This letter is to inform you that **it is possible to set up a biological chain reaction with a highly contagious construct virus, and it is conceivable that extremely powerful bombs of a new type may thus be constructed** by individuals.

Nuclear blindness is the mistaken belief that the bigger the bang, the more powerful the weapon. **A highly contagious construct virus is a bomb that keeps exploding through the population at a geometric rate.**

"A virus that has been engineered in the laboratory is called a recombinant virus. This is because its genetic material-DNA or RNA-has genes in it that come from other forms of life. These foreign genes have been inserted into the virus's genetic material through the process of recombination. The term construct is also used to describe it, because the virus is constructed of parts and pieces of genetic code-it is a designer virus, with a particular purpose." -The Demon in the Freezer by Richard Preston, 2002, page 220

"In truth, it is possible to imagine a malicious use for virtually any biological research or production site. The difference between a lab for producing lifesaving vaccines and one capable of making deadly toxins is largely one of intent." -"Terrorism and the Biology Lab" by Henry C. Kelly, New York Times, July 2, 2003

I estimate it is over ten times easier to construct a highly contagious virus than it is to enrich uranium using the gas centrifuge method.

I estimate it is over ten times easier to set up a biological chain reaction with a highly contagious virus than it is to set up a nuclear chain reaction with a sufficient quantity of enriched uranium.

I estimate it is over ten times easier for a terrorist to deliver a highly contagious virus than a nuclear bomb. A virus can be easily smuggled because it is small and nonmetallic, and can be used as seed stock to make an unlimited number of bombs.

I estimate there are over one million people with the technical knowledge and access to the necessary lab equipment to construct a highly contagious virus. That number is growing.

"The main thing that stands between the human species and the creation of a supervirus is a sense of responsibility among individual biologists." -The Demon in the Freeze, page 227

"The National Intelligence Council, the CIA's in-house think tank, warned in a report (Mapping the Global Future) that **terrorists were more likely to obtain and use pathogens and pestilence than nuclear weapons to cause mass casualties in the next 15 years**. The council **based its assessment on dramatic advances in genetic research and biotechnology, the availability of scientific information and supplies on the Internet, and the emergence of sophisticated terrorist "groups, cells and individuals" who may be "particularly suited" to brewing lethal germs at home.** "Indeed, **the bioterrorist's laboratory could well be the size of a household kitchen, and the weapon built there could be smaller than a toaster,"** the council wrote. "**Terrorist use of biological agents is therefore likely, and the range of options will grow**."" --Los Angeles Times, January 17, 2005

AT Nukes O/W

Nukes don't outweigh –

A] missile defense and early warning systems check plus we've won sufficient case defense

B] vaccines and masks don't stop increased transmissibility and disease that are more infectious and lethal would be coronavirus but faster and deadlier which has prevailed against countermeasures-clearly the world has none

C] They're the most destructive- no taboo to use and they o/w on scope

Abboud 18

Catastrophic Impacts of Biological Warfare on Biodiversity By Nura A. Abboud | September 22, 2018 | Environment, Nature, Pollution https://www.ecomena.org/impacts-of-biological-warfare-on-biodiversity/ Nura A. Abboud is an environmental activist and Founder of the Jordanian Society for Microbial Biodiversity (JMB), the only NGO in the Middle East concerning the microbial biodiversity. Nura specializes in molecular biology, biological sciences, microbial biodiversity, genetic fingerprinting and medical technologies. Her vision is to establish an eco-research center in the astonishing desert south of Jordan. She has received several scholarships and awards including honorary doctorate in Environmental leadership.//qlsms

Biological weapons are considered the most dangerous of all known weapons of mass destruction. They are used to deliberately cause epidemics among humans; destroy the environmental components, including water, air, and soil; and target crops and livestock. Examples of diseases used in biological warfare include anthrax, smallpox, plague, cholera, and avian flu. In addition to the catastrophic effects of biological warfare on the biodiversity and the environment, their danger lies in their low cost and rapid spread, as well as their easy preparation, transport, and use.

Unlike nuclear and chemical bombs, biological bombs are without odor or color and therefore cannot be detected. Additionally, bioweapons are dangerous because of their effects on untargeted organisms in a military attack, and the clinical symptoms they create may be difficult to distinguish from normal diseases. Bioweapon pathogens remain in nature for several years and are able to survive in harsh environmental conditions.

Link debate

The link debate –historical evidence and economic theory flow neg because of cross elasticity of demand across WMDs. When you lose one WMD, demand for another goes up loss of nukes increases demand for CBWs cuz they function as substitutes within the category of WMDs. It'd lead to an arms race as more and more countries build up their stockpiles in response to some countries shifting which increases the risk of miscalc and usage especially cuz countries don't think the impact is that bad.

Our ev o/w

A] Quals - link is peer reviewed and written by Phds in international security at Penn State and UCSB.

B] Scope – it's an analysis of all countries that pursued WMDs over the last 80 years and concludes nukes and bioweapons are substitutes

C] Recency – most of their ev is super old and from ___ which means you should err towards our link explanation cuz its way more recent – recency k2 accounting for tech advances and changing international dynamics

It's empirically proven by India – they were developing bioweapons until 1974 when they got their first nuclear weapon at which point they signed the bioweapons convention and ended their program.

Empirics outweigh – they account for all available reasons for and against something by accounting for the real world which is better than abstract theorizing.

AT No Incentive

1] It's a shift argument- all of the tensions between states that exsist just flip to the neg and they would attack with bioweapons- the aff only de-escalates in a world where there isn't an alternative – but our link says there is a huge one- bioweapons

2]X-apply our framing about no taboo- that means that in the world of the aff, conflict will alwy be inevitable proven by the fact state rise to the nuclea threshold often, but theres a massive taboo against nuke use that prevents them from deploying that DOESN'T exist for bioweapons which makes use likely

3] Independently, without use, the arms race to create a bioweapons arsenal leads to miscalc that makes lab accidents likely- extinction

AT Countermeasures

--AT: Koblentz

1] Our Millett ev accounts for their objections like spread, countermeasures, and resistance but concludes neg cuz of our explanation above about bioengineering pathogens

2] Only sophisticated countries have sufficient defense and response time – unexpecting countries or small countries in the Balkans, Baltics, Central Asia, Africa, or Korean region would suffer heavy casualties – coronavirus infection proves spread and that even large countries like China and Pakistan can't manage it

Corona means the healthcare industry is even more strained which means the impact is magnified- mask shortages, resources being directed towards a corona vaccine means that the health industry won't be able to keep up

AT No Knowledge

1] Countries that ended programs can restart them and develop infrastructure which resolves knowledge gaps and lack of programs –a shift would occur which means it doesn't matter if it exists now

2] Countries just do new r&d post plan cuz that's the logical result of our link - boosts the impact scenario

AT Burnout

No burnout

Bar-Yam 16 (Yaneer, MIT PhD, Founding President of the New England Complex Systems Institute, PhD in Physics, "Transition to extinction: Pandemics in a connected world," NECSI, July 3, 2016, http://necsi.edu/research/social/pandemics/transition)

Watch as one of the more aggressive – brighter red – strains rapidly expands. After a time it goes extinct leaving a black region. Why does it go extinct? The answer is that it spreads so rapidly that it kills the hosts around it. Without new hosts to infect it then dies out itself. **That the rapidly spreading pathogens die out has important implications for evolutionary research** which we have talked about elsewhere [1–7].

In the research I want to discuss here, **what we were interested in is the effect of adding long range transportation** [8]**. This includes natural means of dispersal as well as unintentional dispersal by humans, like adding airplane routes, which is being done by real world airlines** (Figure 2).

When we introduce long range transportation into the model, the success of more aggressive strains changes. They can use the long range transportation to find new hosts and escape local extinction. Figure 3 shows that the more transportation routes introduced into the model, the more higher aggressive pathogens are able to survive and spread.

As we add more long range transportation, **there is a critical point at which pathogens become so aggressive that the entire host population dies.** The pathogens die at the same time, but that is not exactly a consolation to the hosts**. We call this the phase transition to extinction** (Figure 4). **With increasing levels of global transportation, human civilization may be approaching such a critical threshold**.

In the paper we wrote in 2006 about the dangers of global transportation for pathogen evolution and pandemics [8], we mentioned the risk from Ebola. Ebola is a horrendous disease that was present only in isolated villages in Africa. It was far away from the rest of the world only because of that isolation. Since Africa was developing, it was only a matter of time before it reached population centers and airports. While the model is about evolution, it is really about which pathogens will be found in a system that is highly connected, and Ebola can spread in a highly connected world.

The traditional approach to public health uses historical evidence analyzed statistically to assess the potential impacts of a disease. As a result, many were surprised by the spread of Ebola through West Africa in 2014. As the connectivity of the world increases, past experience is not a good guide to future events.

A key point about the phase transition to extinction is its suddenness. Even a system that seems stable, can be destabilized by a few more long-range connections, and connectivity is continuing to increase.

So how close are we to the tipping point? We don't know but it would be good to find out before it happens. While Ebola ravaged three countries in West Africa, it only resulted in a handful of cases outside that region. One possible reason is that many of the airlines that fly to west Africa stopped or reduced flights during the epidemic [9]. In the absence of a clear connection, public health authorities who downplayed the dangers of the epidemic spreading to the West might seem to be vindicated.

As with the choice of airlines to stop flying to west Africa, our analysis didn't take into consideration how people respond to epidemics. It does tell us what the outcome will be unless we respond fast enough and well enough to stop the spread of future diseases, which may not be the same as the ones we saw in the past. As the world becomes more connected, the dangers increase.

Are people in western countries safe because of higher quality health systems? Countries like the U.S. have highly skewed networks of social interactions with some very highly connected individuals that can be "superspreaders." The chances of such an individual becoming infected may be low but events like a mass outbreak pose a much greater risk if they do happen. **If a sick food**

service worker in an airport infects 100 passengers, or a contagion event happens in mass transportation, an outbreak could very well prove unstoppable.

Engineerable drug resistance overcomes burnout – it enables optimal virulence which maximizes disease fitness

Schroeder et al 17 – Meredith Schroeder, PhD candidate, Department of Microbiological Sciences; North Dakota State University, Benjamin D. Brooks, PhD, Department of Electrical and Computer Engineering; North Dakota State University, and Amanda E. Brooks, PhD, Department of Pharmaceutical Sciences, North Dakota State University ("The Complex Relationship between Virulence and Antibiotic Resistance," *Genes*, Vol. 8, No. 1, page 39, January 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5295033/)

Antibiotic resistance, prompted by the overuse of antimicrobial agents, **may arise from** a variety of mechanisms, particularly **horizontal gene transfer of virulence and antibiotic resistance genes**, which is often facilitated by biofilm formation. The importance of phenotypic changes seen in a biofilm, which lead to genotypic alterations, cannot be overstated. Irrespective of if the biofilm is single microbe or polymicrobial, bacteria, protected within a biofilm from the external environment, communicate through signal transduction pathways (e.g., quorum sensing or two-component systems), leading to global changes in gene expression, enhancing virulence, and expediting the acquisition of antibiotic resistance. Thus, **one must examine a genetic change in virulence and resistance** not only in the context of the biofilm but also **as inextricably linked pathologies**. Observationally, it is clear that **increased virulence and the advent of antibiotic resistance often arise almost simultaneously**; however, their genetic connection has been relatively ignored. Although the complexities of genetic regulation in a multispecies community may obscure a causative relationship, **uncovering key genetic interactions between virulence and resistance in biofilm bacteria is essential to identifying new druggable targets**, ultimately providing a drug discovery and development pathway to improve treatment options for chronic and recurring infection.

1. Introduction

Until recently, **conventional** "antibiotic **wisdom**" **suggesting the presence of a fitness cost associated with** the development of **antibiotic resistance that would eventually allow susceptible species to overtake resistant species was the predominating dogma** in infectious diseases [1]. However, **the ever-increasing threat of antibiotic resistant bacteria contradicts dogma and insinuates that the evolution of resistance may be associated with a fitness advantage, including enhanced virulence** [2,3]. Although virulence has now been directly related to multidrug resistance in several animal infection models [2], the mechanism of virulence regulation in this climate of antibiotic resistance remains elusive. This review will explore the relationship between the mechanisms of acquired antibiotic resistance and enhanced virulence, a critical link in our war on the emergence of multidrug resistant bacteria.

AT Hard to make

No barriers

--AT: no scale up, no inspections

Shambhavi 19 "Naik, Shambhavi, research fellow, Ph.D in Cancer Biology from University of Leicester, 3 years of experience as a post-doctoral fellow at NCBS. Takshashila Institution "Assessing Measures for India to Tackle Biowarfare Threats." Takshashila Discussion Document, April 23, 2019-03. https://takshashila.org.in/wp-content/uploads/2019/05/TDD-Bioweapons-Convention-SN-2019-03-1.pdf

Bioweapons hold much appeal to both **state** and non-state **actors** in addition to other weapons.

Bioweapons offer two advantages over traditional weapon systems:

1. They are easy to mass-produce: **Unlike nuclear** and chemical **weapons**, **biological weapons do not need to be stored in huge quantities; they can be easily mass-produced at short notice**. Thus, **storage costs and precautionary measures are minimal for biological weapons**.

2. **Stocks can be easily destroyed and restored**: **In the event of inspection, a miniscule quantity of the stock bioweapons can be retained and regrown if required, making it easier to escape scrutiny**. Thus, bioweapons need not be stockpiled in huge quantities.

AT No Shift

Yes shift—that's our link explanation-

Our link is specific and statistically sound

Horowitz et al 13 – University of Pennsylvania political science professor

[Michael, and Neil Narang, UC Santa Barbara political science, "Poor Man's Atomic Bomb? Exploring the Relationship between 'Weapons of Mass Destruction'," Journal of Conflict Resolution, 58.3, 2013, accessed 12-13-19]

Finally, we turn to estimating the effect of both nuclear and chemical weapons pursuit and acquisition on the risk of initiating biological weapons pursuit in models 5 and 6. These results are equally interesting because they provide support for the notion that **biological weapons** (in addition to chemical weapons) **can** also **be appropriately considered a "poor man's nuclear bomb."** Similar to the impact of possessing nuclear weapons on the probability a state pursues chemical weapons, **nuclear weapons possession has a strong negative effect on biological weapons pursuit** in both models 5 and 6. **After holding the underlying level of demand constant** in model 6, simply **possessing a nuclear weapon appears to decrease the instantaneous risk that a state will pursue biological weapons to virtually zero** (**1.44 x 10^-7**). **This is consistent with the understanding of nuclear weapons as so powerful that they make the possession of other types of WMDs less relevant**. Even before countries such as the United States abandoned their chemical weapons programs, for example, they abandoned their biological weapons program. **The United States eliminated its offensive BW program under a Nixon administration order in 1969** and had shut down the program by the time it signed the BWC in 1972. **France and Great Britain similarly eliminated their offensive BW programs**. Russia stands in stark contrast to this argument, however. Evidence revealed after the cold war demonstrated that the Soviet Union maintained a vibrant offensive BW program at the Biopreparat complex through the end of the cold war. This demonstrates that grouping CBWs into a single category may not accurately represent the way countries actually think about them. Biological weapons, given their greater theoretical destructive capacity, may be considered somewhat differently. This is a potential path for future research.

AT Secrecy = No Deterrence

No impact or implication –

A] Our scenario has nothing to do with deterrence or credible threats, just that if states develop CBW then they'll use the weapons

B] There's no warrant for why states will necessarily want or need to issue credible threats with bioweapons – conventional weapons solve deterrence cuz war is bad

C] Even if they release some details, they can do that without giving away the nature of a disease's transmission, lethality, etc which means we still get out impact

AT Treaties

1] International agreements can't solve bioweapons – no enforcers and

Cross 17 (8/15, Glenn Cross is the author of the recent book, "Dirty War: Rhodesia and Chemical, Biological Warfare." He has served for 29 years in the Intelligence Community as a CIA analyst, manager of biological weapons analysts in the FBI, and in the ODNI as the deputy NIO for WMD, responsible for IC's biological weapons analysis from 2008 to 2010. Dr. Cross holds an AB from Columbia University, an MA from King's College, London in War Studies, a second MA (with distinction) from George Mason University, and a PhD from George Mason's Graduate School of Science in Biodefense, where the former deputy head of the Soviet biological weapons program, Ken Alibek, was his dissertation advisor. Dr. Cross went on to do a postdoctoral fellowship at Georgetown University Medical School developing means for attributing biological weapons attacks. "LONG IGNORED: THE USE OF CHEMICAL AND BIOLOGICAL WEAPONS AGAINST INSURGENTS", https://warontherocks.com/2017/08/long-ignored-the-use-of-chemical-and-biological-weapons-against-insurgents/)

Although a prevailing assumption has held that chemical and biological weapons will not be used because of a combination of ineffectiveness, international norms, and international agreements, Rhodesia and Syria show that this perspective doesn't tell the full story. Deterrence (i.e., the credible threat of military action) likely is the only effective means of preventing the use of these weapons. **International agreements and prohibitive international norms or taboos are largely ineffective unless the political will exists to punish the transgressor. Prohibitions against chemical and biological weapons are enshrined in international agreements**, most notably the Biological Weapons and Toxins Convention and the Chemical Weapons Convention. **Yet these agreements have been ineffective in constraining the production and use of these agents**.

The **political will for action in the international community has also long been severely lacking – witness the inaction after** the gassing in **Halabja and** President Obama's "red line" in **Syria**. After the Obama administration ultimately decided against striking Syria in 2013, the Kerry-Lavrov agreement resulted in Damascus' accession to the Chemical Weapon Convention and its surrender of declared chemical weapons stocks for destruction. Yet as later events demonstrated, Syria retained chemical weapons materials and remained willing to use them against civilians, making the ultimate value of the Kerry-Lavrov agreement questionable.

Despite the conventions, several state parties to these agreements likely have chemical and/or biological weapons programs. A number of states have maintained biological weapons programs in contravention to the Biological Weapons Convention, as demonstrated by the well-known example of Yeltsin's termination of the Soviet program in 1992. Another party to the convention, **South Africa, developed and used biological weapons agents for over a decade after ratifying** the agreement. Although the Chemical Weapons Convention now has been in force for 20 years, several signatories likely still possess chemical weapons. According to a June 2017 fact sheet assembled by the Arms Control Association, convention signatories thought to possibly retain covert chemical agents or munitions include China, Iran, Israel, North Korea, Russia, and Syria.

The apparent lack of international political will to confront the use of chemical and biological weapons should be evidence that the norms and taboos against the production, possession, and use of these weapons have eroded. Those norms and taboos represent the prevailing international consensus — embodied in international agreements — that underpins the political will to action. Norms represent a consensus defining appropriate and inappropriate conduct by nation-states under anarchic conditions. Norms are not universal nor are they immutable. Taboos, on the other hand, are prohibitions on conduct considered so morally repugnant and reprehensible so as to be universally condemned. **Following the experiences of World War I, chemical and biological weapons became taboo. But even so, World War II saw a massive increase in the number of national chemical and biological**

programs. Arguably, Allied and Axis powers were deterred from using these weapons by fear of retaliation from the opposing side.

Yet the Axis powers used chemical and biological agents on an enormous scale against vulnerable populations. Japanese units using weapons developed by Unit 731 wrought untold destruction on Chinese military units and civilian communities. For his part, Adolf Hitler may have prohibited use of chemical and biological agents against Allied forces, yet he was not dissuaded from using poison gas (Zyklon B) against millions of civilians. In neither of these instances was the taboo effective. The effect of deterrence and the relevance of international norms in preventing chemical and biological weapons use is arguably lessened when a nation-state is facing an ill-prepared or vulnerable population. The Arab, Rhodesian, and South African cases all bear this out.

Syria's recent use of chemical weapons likely has diminished effectiveness of the chemical and biological prohibitions, as have previous uses (i.e., Egypt, Libya, and Iraq). The international community's failure to act more decisively may embolden other marginal nations to explore chemical and biological adoption and use to counter threats to their internal security.

2] Inspections fail – countries can avoid monitoring by working out of civilian or secret labs and storing bioweapons in small quantities at random sites

Shambhavi 19 "Naik, Shambhavi, research fellow, Ph.D in Cancer Biology from University of Leicester, 3 years of experience as a post-doctoral fellow at NCBS. Takshashila Institution "Assessing Measures for India to Tackle Biowarfare Threats." Takshashila Discussion Document, April 23, 2019-03. https://takshashila.org.in/wp-content/uploads/2019/05/TDD-Bioweapons-Convention-SN-2019-03-1.pdf

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3] Treaties are eroding

Tadjdeh 19 [Yasmin Tadjdeh is the Senior Editor for National Defense Magazine.] "CBRN Conference News: Defense Officials See Increased Threat from Chinese, Russian Chem-Bio Weapons." National Defense. July 23, 2019. https://www.nationaldefensemagazine.org/articles/2019/7/23/defense-officials-see-increased-threat-from-chinese-russian-chembio-weapon TG

"**Over the past few years, we've gotten numerous examples of the emerging and reemerging threats** space out there, ... from non-state and state adversaries," Kilianski said.

It's no longer rare for nations to use these types of lethal agents, he said.

"**What we've seen over the past few years is the norms around chemical and biological weapon use have been eroded almost completely**," Kilianski said. "**The**

norms surrounding these and the treaties surrounding these have really taken a hit."

Retired Army Brig. Gen. William King, who now works as an executive advisor with Booz Allen Hamilton focusing on countering weapons of mass destruction, said the Defense Department has to prepare now.

It's only a matter of when — not if — a chemical or biological attack will occur, he said. "It's already happened and [is] happening, and **the inhibition to use some of these threats is no longer there**."

AT Harker

AT: No Link – PGS Shift (Zala)

1] Zala is in the context of the US but doesn't apply cuz we already have a PGS system and would just strengthen it, but other countries won't just up and start a whole new strike system – they'd shift to CBW which means our impact happens in countries like North Korea or IndoPak that are also more willing to use bioweapons on their neighbors

2] Their ev says disarm would cause a shift to other advanced weaponry and lists PGS as an example but not the only form of weaponry – CBW are also non-nuclear deterrence options which means the disad isn't mutually exclusive with the affs shift

AT: Disarm Solves (Brehm)

1] Their ev is in the context of broader disarm which the aff doesn't solve since they're only nuclear disarm – no warrant for why nuclear disarmament is sufficient solvency

2] Empirically denied – there were loads of wars before nuclear weapons existed like the two world wars, IndoPak wars, regional African conflicts, the Japanese invasion of China, and more – nuclear disarm won't stop rising tensions and other causes for war because Iran will still supply Hezbollah and hate Saudi Arabia and Israel, and North Korea will still feel threatened by China and the South which are just two examples of flashpoints

AT: Terrorists (Sizemore)

[If NoKo] They haven't isolated which terrorists will launch the NoKo bioweapons – obviously Kim Jong Un is super big on security and won't just leave them lying around plus he's probably already killed all the terrorists

] Empirically denied – their ev just says terrorists like biological agents but we haven't seen a major bioterror attack which disproves their arg

] Turn – more countries developing CBW would be awful cuz it increases the risk that terrorists get their hands on a floating bioweapon or hit a low-security facility which means its try or die for the disad

AT: Development Inev – MIC (Hartung)

1] This is in the context of the US but doesn't apply cuz even if we have restraint other countries don't – [explain NoKo striking SoKo]

2] MIC lobbying is for arm sales, fighter jets, carriers, and nukes right now cuz nobody cares about CBW – the plan makes it worse by removing nukes from the equation and shifting to CBW

AT: Development Inev – Tech (Pavelec)

1] No reason CBW development is inevitable – countries don't do it right now but more would post plan and it'd spark a CBW arms race – a larger percent of countries with CBW increases risk of usage since more actors could launch and it's not perceived to be as bad as nukes

2] This article is titled "inevitability of weaponization of space" – it's about military tech in the space race not nukes or CBW which means our ev auto-outweighs cuz it's actually specific to the plan