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COVID-19

ANALYSIS AND POLICY IMPLICATIONS

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ABOUT THE CENTER FOR STRATEGIC AND BUDGETARY ASSESSMENTS (CSBA)

The Center for Strategic and Budgetary Assessments is an independent, nonpartisan policy research institute established to promote innovative thinking and debate about national security strategy and investment options. CSBA's analysis focuses on key questions related to existing and emerging threats to U.S. national security, and its goal is to enable policymakers to make informed decisions on matters of strategy, security policy, and resource allocation.

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The analysis and findings presented here are solely the responsibility of the authors.

Cover: The Military Sealift Command (MSC) hospital ship USNS Mercy (T-AH 19) navigates alongside USS Abraham Lincoln (CVN 72) after arriving on station near Banda Aceh, Sumatra, Indonesia, February 2005. U.S. Navy photo by Photographer's Mate 3rd Class Gabriel R. Piper. Design by Peter Kouretsos.

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CHAPTER 1

Introduction

The world is ill-prepared to respond to a severe influenza pandemic or to any similarly global, sustained and threatening public-health emergency.[1]

International Health Regulations Review Committee (2011)

This ain't no party — this ain't no disco — this ain't no foolin' around.

"Life During Wartime" The Talking Heads (1979)

This report discusses the implications of the current novel Coronavirus pandemic (also referred to as COVID-19) for the Department of Defense (DoD). Below, we explore epidemics from a policy perspective, focus on the immediate-term implications of the pandemic for the Department of Defense, and consider the long-term implications for the U.S. Government and DoD — specifically with respect to funding.

The novel Coronavirus first appeared in China in late 2019 in Wuhan province, and has spread rapidly across the world. Its virulence and high fatality rate — particularly among older adults — have created a public health crisis the likes the world has not seen in living memory.[2] The closure of most businesses in the Western world seems destined to send both national economies and the global economy into recession. Both civil and military resources are being strained in response to this new event.

1 World Health Organization, Report by the Director-General, Implementation of the International Health Regulations (2005): Report of the Review Committee on the Functioning of the International Health Regulations (2005) in relation to Pandemic (H1N1) 2009, (United Nations: New York, 2011) available at https://apps.who.int/gb/ebwha/pdf_files/WHA64/A64_10-en.pdf

2 Verity *et al* "Estimates of the severity of coronavirus disease 2019: a model-based analysis" *The Lancet: Infectious Diseases*, March 30, 2020, available at https://doi.org/10.1016/S1473-3099(20)30243-7.

CHAPTER 2

Epidemics for Policymakers

This Chapter describes in broad terms the mathematics behind epidemics and how insights that come from these models can be applied in the policy realm. It is not a substitute for a technical study focusing on applied probability, simulation, and systems of differential equations.[3] The remainder of the section describes the *Susceptible – Infected – Removed* or *SIR* model of infectious diseases.

Preliminaries: Exponential Growth and "Cohort Models"

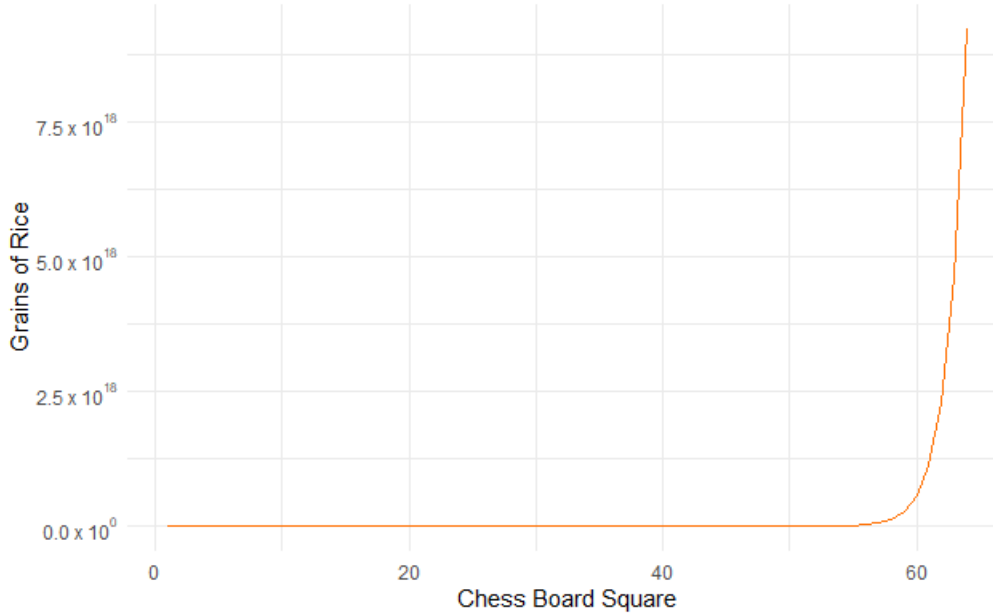
Key to our discussion of epidemics is an understanding of exponential growth. As a motivating example, we will begin with a classic story: A king wanted to reward a brave servant. The servant, being cunning, said "I do not require much; simply take your chessboard and on the first day, place a single grain of rice in the first square. On each day, put twice the amount of rice from the previous day on the next square. Continue that way until we reach the end of the chessboard (64 squares).[4] One grain of rice is not very much, and twice not very much is still not very much, and so on.

Exponential growth is a case where our intuition frequently fails. As an illustrative example, Figure 1 plots the number of grains of rice by chess square:

3 For example, we recommend: Nedialko B. Dimitrov and Lauren Meyers, "Mathematical Approaches to Infectious Disease Prediction and Control", *TutORials in Operations Research* (Baltimore, MD: INFORMS, 2010); Mark E.J. Newman, *Networks: an Introduction*, (Oxford: Oxford University Press, 2010), chapter 12; Daryl J. Daley and Joe Gani, *Epidemic Modeling: An introduction*, (Cambridge: Cambridge University Press, 1999).

4 The institute of mathematics and its applications. The Institute of Mathematics and its Applications, "The Rice and Chessboard Legend," *Maths Careers,* accessed March 30, 2020, available at https://www.mathscareers.org.uk/article/the-rice-and-chessboard-legend/.

FIGURE 1: NUMBER OF GRAINS OF RICE PER EACH CHESSBOARD SQUARE



Note the exponents in the y-axis. The top layers are a 1 with 18 zeros following.

In the end,[5] the number of grains of rice will be 2 with 19 zeros following.[6] The mass of the rice is 150,000 times that of the Empire State Building.

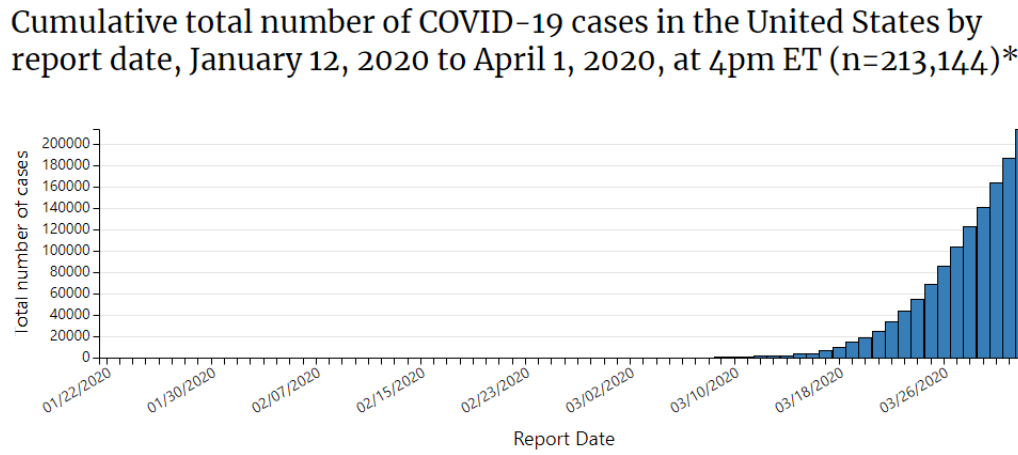
Exponential growth is important for our purposes because in early stages, it closely approximates the type of growth that epidemics exhibit. For human policymakers, exponential growth looks like — at the beginning — linear growth. Until the window for action is past.

For an unsettling demonstration of exponential growth, consider the plot of growth in COVID-19 cases from the U.S. CDC (Figure 2).

5 Here we've used the combinatorial identity

6 Richard Feynman referred to this class of number as "economic": "There are 10^11 stars in the galaxy. That used to be a huge number. But it's only a hundred billion. It's less than the national deficit! We used to call them astronomical numbers. Now we should call them economical numbers." As quoted in T.C. London, "Big Numbers: Astronomically Inaccurate," *The Economist,* January 31, 2011, available at https://www.economist.com/johnson/2011/01/31/astronomically-inadequate

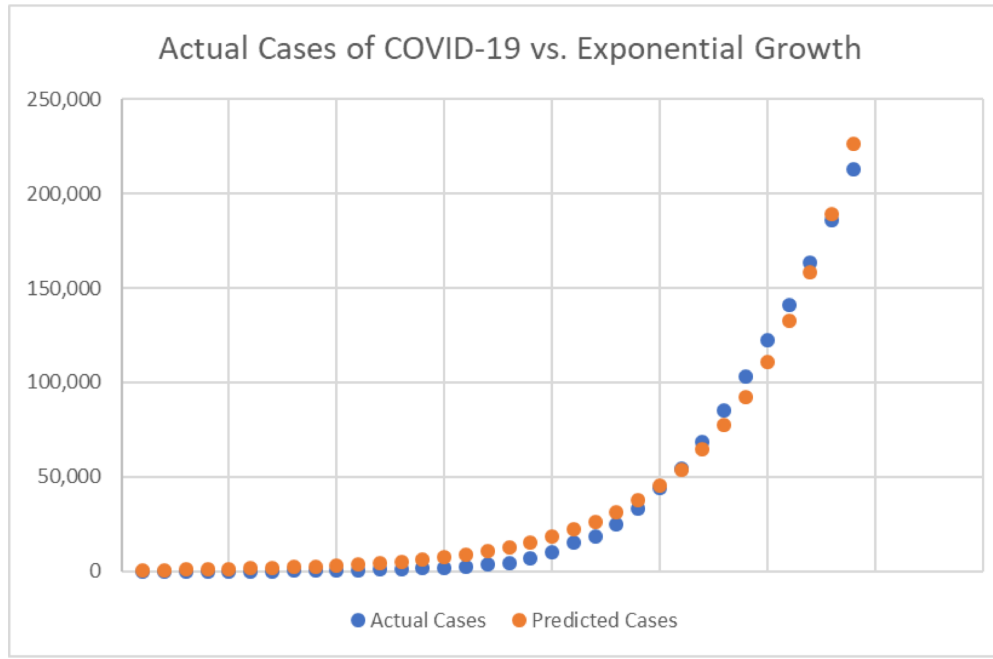
FIGURE 2: CUMULATIVE CASES OF COVID–19 FROM CENTERS FOR DISEASE CONTROL (CDC)



Screenshot from CDC Website taken Noon EST 3 April 2020

A comparison of the data from the CDC with exponential growth is offered as Figure 3 without comment.

FIGURE 3: COMPARISON OF ACTUAL (BLUE) WITH EXPONENTIAL GROWTH (ORANGE) CASES



Data current as of April 3, 2020

The type of mathematical model we will apply against this is called a cohort model. This is a mathematical construct where a population may be placed into different groupings (cohorts — hence the name) and a set of rules is put into place that determines how the groups interact.

We already use these types of models in defense analysis, specifically Lanchester Equations where a population of belligerents is segmented into blue and red. This type of thinking forms the basis of a fair number of simulations and other tools used to gain insights inside DoD[7]; in other words, this math is not that different from what we already use.

Models of infectious disease follow the same fundamental logic, except that rather than being formulated as belligerents on opposing sides, the cohorts represent individuals with different infection status within a population. The number of classifications of individuals with respect to infection — as well as the ways that they interact — may have arbitrary complexity, by which we mean any set of rules for interaction may be developed and analyzed.[8] Finding numerical solutions to these types of dynamical systems in practice is straightforward, given some background education and appropriate computing tools.[9]

The S-I-R Model

For the remainder of this chapter, we focus on the classic Susceptible – Infected – Removed (or S-I-R) Model developed by Kermack and McKendrick.[10] In this construct, a homogeneous population may be divided into three mutually exclusive and collectively exhaustive categories:

Class S: Susceptible. These individuals have not been exposed to infection. They face the possibility of becoming infected if they come in contact with an infected individual.

Class I: Infected. These individuals carry the infection. They will spread the infection to Susceptible individuals with some probability if they interact with them. They will transition to the Removed class after being infected for some time, which is generally

7 For example, CSBA's recent Mosaic Warfare games employed a Lanchester construct: Bryan Clark, Daniel Patt and Harrison Schramm *Mosaic Warfare: Exploiting Artificial Intelligence and Autonomous Systems to Implement Decision-Centric Operations"* (Washington, DC: Center for Strategic and Budgetary Assessments, 2020) available at https://csbaonline.org/research/publications/mosaic-warfare-exploiting-artificial-intelligence-and-autonomous-systems-to-implement-decision-centric-operations

8 For example, see Moshe Kress, "The Effect of Social Mixing Controls on a Two-level Model," *Health Care Management Science*, 8, 277-289, 2005 available at https://faculty.nps.edu/mkress/docs/KressHCMS_Published_Nov05.pdf

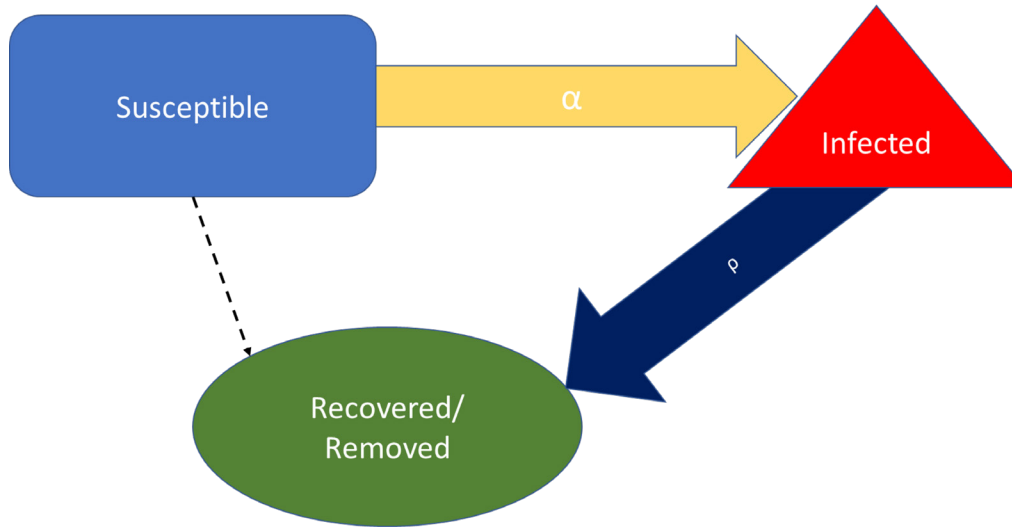
9 R Core Team, *R: A language and environment for statistical computing* (Vienna, Austria: R Foundation for Statistical Computing, 2020) available at https://www.R-project.org/

10 W. O. Kermack, and A. G. McKendrick. "A Contribution to the Mathematical Theory of Epidemics." Proceedings of the Royal Society of London. Series A, Containing Papers of a Mathematical and Physical Character 115, no. 772 (1927): 700-21. Accessed April 7, 2020. www.jstor.org/stable/94815.

represented as a rate. Infection spread is represented as a rate, β, which measures both the intensity of interaction between groups as well as the recovery rate, ρ.

Class R: Removed.[11] These individuals are past the infectious stage and are inert with respect to the disease. Vaccination works by moving individuals directly from S to R without passing through the Infected stage. The notion of "herd immunity" comes from the notion that class R is so pervasive that it completely dilutes Class I to the point that any given member of class S has very little probability of interacting with them.

FIGURE 4: INTERACTIONS BETWEEN THREE CLASSES IN S-I-R MODEL

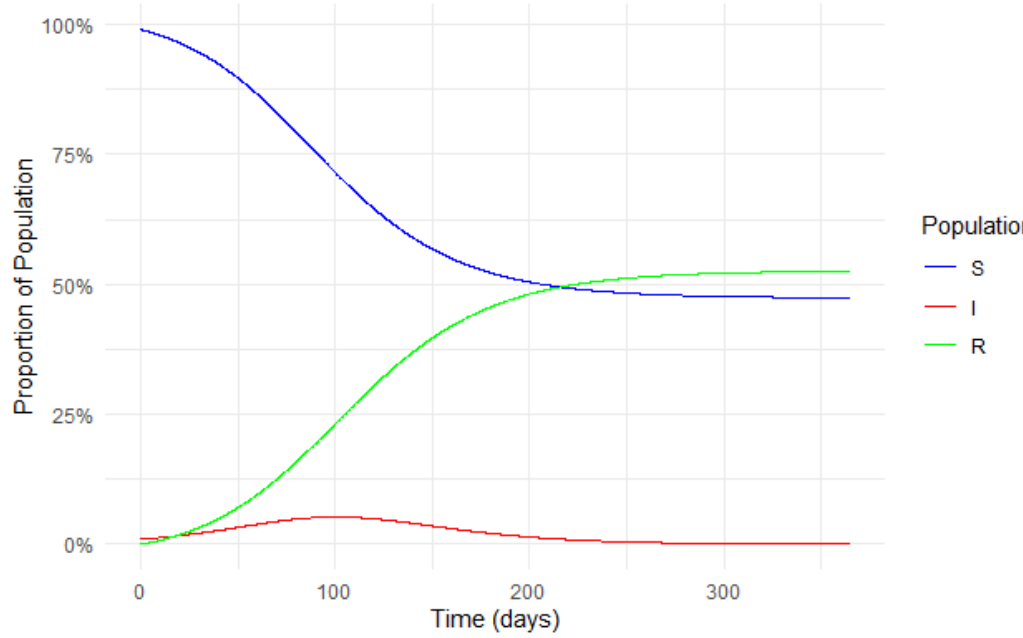


The dashed arrow represents the effect of vaccination, when available. Policymakers and doctors have two 'levers' to adjust with this model: , which represents the intensity of interaction between the S and I populations, and , which represents the rate of recovery from infection.

A typical time trace of the S-I-R model is presented in Figure 5. The choice of parameters used is representative of our best understanding at press time of the actual behavior of COVID-19.

11 "R" used to stand for "recovered" but this class also includes individuals that do not survive the infection, i.e. dead.

FIGURE 5: TIME TRACE BASED ON ESTIMATES OF COVID-19 IN A HOMOGENEOUS POPULATION



Note that although the total infected population never gets higher than ~7%, in this scenario over 50% of the population is eventually infected.

In the cases we study where infection takes hold in the general population, the rate of cases (slope of infection curve) peaks and then decreases because, as the infection spreads more broadly through the population, the number of susceptibles decreases and the number of infected / recovered increase. The result is that the probability of an infected interacting with a susceptible decreases. The important insight for policymakers to remember is that **a slowing of the number of infections will happen even if no preventative measures are put in place, and that this slowing by itself is not sufficient to conclude that measures are working.**

Insights from the SIR Model

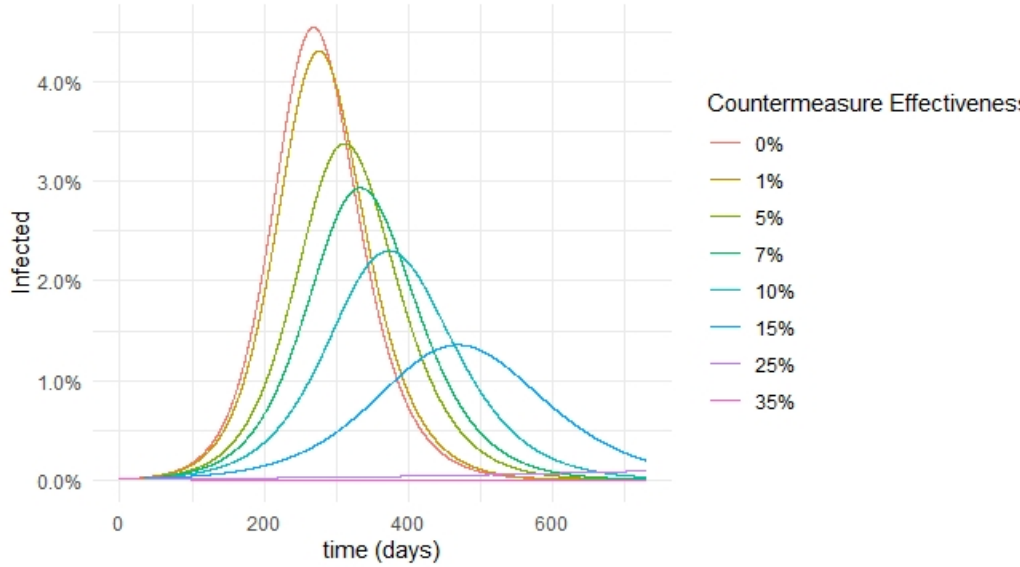
We can use this model to explore policies and their impact on the eventual trajectory of the disease. There are — broadly speaking — two things that policymakers can use to mitigate spread — two "levers." They are:

I. Decrease the rate at which infection spreads among the susceptible population — also known as "flattening the curve." Doing this slows the rate of infection, which reduces the number of infected individuals at any given time, but also has the side-effect of lengthening the overall infection.

II. Speed the rate at which individuals are recovered. This consists of developing effective treatments, as well as a vaccine, which would immediately move individuals in class S to class R.

We are seeking policy solutions that will change the rules of the infection "game" in humanity's favor.[12] We first explore flattening the curve, as shown in Figure 6:

FIGURE 6: "FLATTENING THE CURVE"



In this figure, different measures are evaluated based on their ability to slow the rate of infection (with no change to the rate of recovery). We see that as the curves are "flattened," the peak of infection moves down and to the right — happening later and affecting a smaller proportion of the population simultaneously.

Flattening the curve has several important side effects. There will come a point beyond which U.S. Healthcare resources are saturated; pushing the peak down will help avoid this case. Additionally, flattening the curve lowers the overall incidence of infection in the population. The downside to flattening the curve is that it requires that measures to reduce spread — which are wreaking havoc on the economy — will need to stay in place for a significant amount of time; likely to be months.

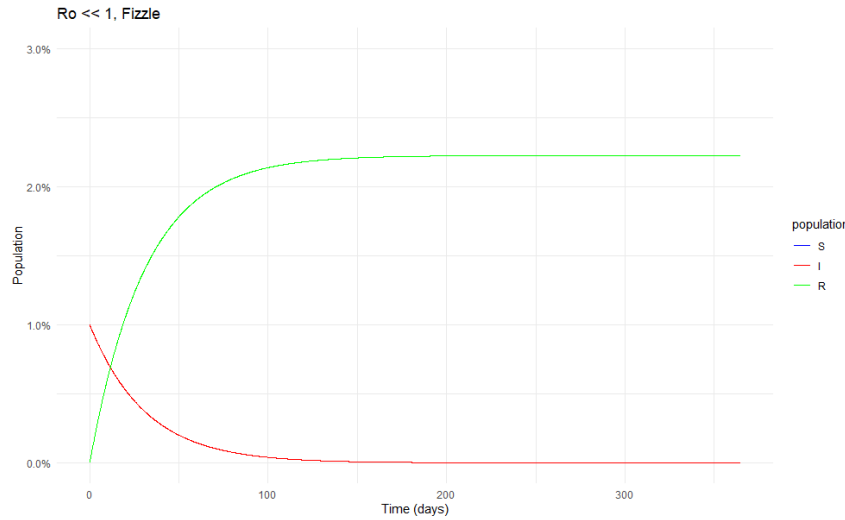
12 An application of epidemic models where the rules are changed *in situ* is explored in Harrison Schramm and Nedialko Dimitrov, "Differential Equation Models for Sharp Threshold Dynamics", *J. Math. Biosci.* 2013 DOI: 10.1016/j.mbs.2013.10.009

Flash, Fizzle, or Slow Burn?

At press time, we are of the analytically informed opinion we are still in the opening phases of this epidemic.[13] A measure of an infection's virulence near the beginning of infection is the "Basic Reproductive Number." Often referred to as Ro (R-naught), this represents the number of follow-on cases each case causes near the beginning of the infection. For example, Ro = 4 implies that each infected individual, on average, infects 4 others. As we have written previously,[14] our future with this virus has three possible futures, which we will refer to henceforth as *Fizzle, Flash,* and *Slow-Burn*, which we show as Figure 7.

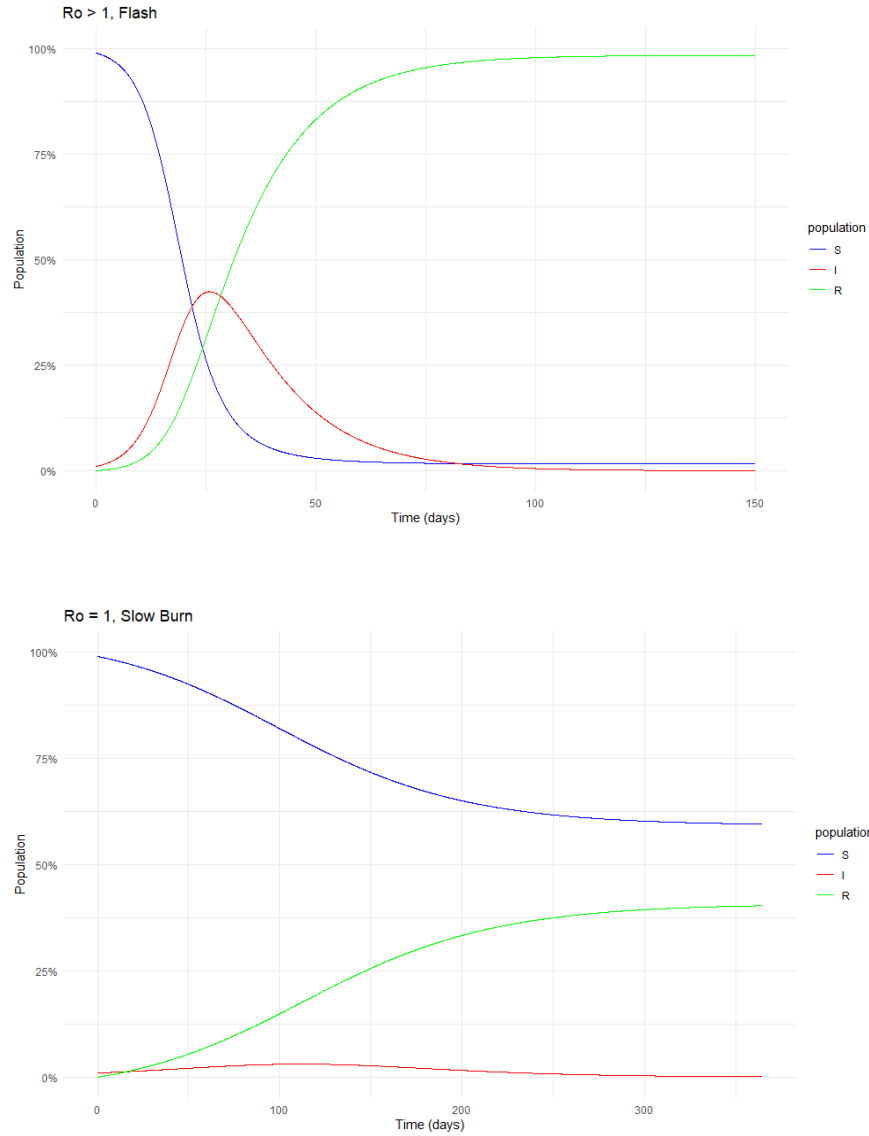
The best case by many measures is the one we call "fizzle." Here, the basic reproductive number is substantially below 1, and the infection essentially goes nowhere. An example of this is shown below. The worst scenario, from a death toll perspective, we call "flash." Here, measures to reduce the speed of spread are ineffective, and each infection will create more than one follow-on infection — a chain reaction that experiences sustained exponential growth.

FIGURE 7: FIZZLE, FLASH, AND SLOW BURN



13 Centers for Disease Control and Prevention, "Coronavirus 2019 COVIDView," *CDC.gov*, accessed April 3, 2020 available at https://www.cdc.gov/coronavirus/2019-ncov/covid-data/covidview.html

14 Harrison Schramm, "Infection reproductivity: Fizzle, Flash, or slow burn?" *INFORMS Analytics Magazine*, March 20, 2020, available at https://pubsonline.informs.org/do/10.1287/LYTX.2020.02.17/full/



These three different futures are determined largely by the aggressiveness and effectiveness of public health measures currently in place.

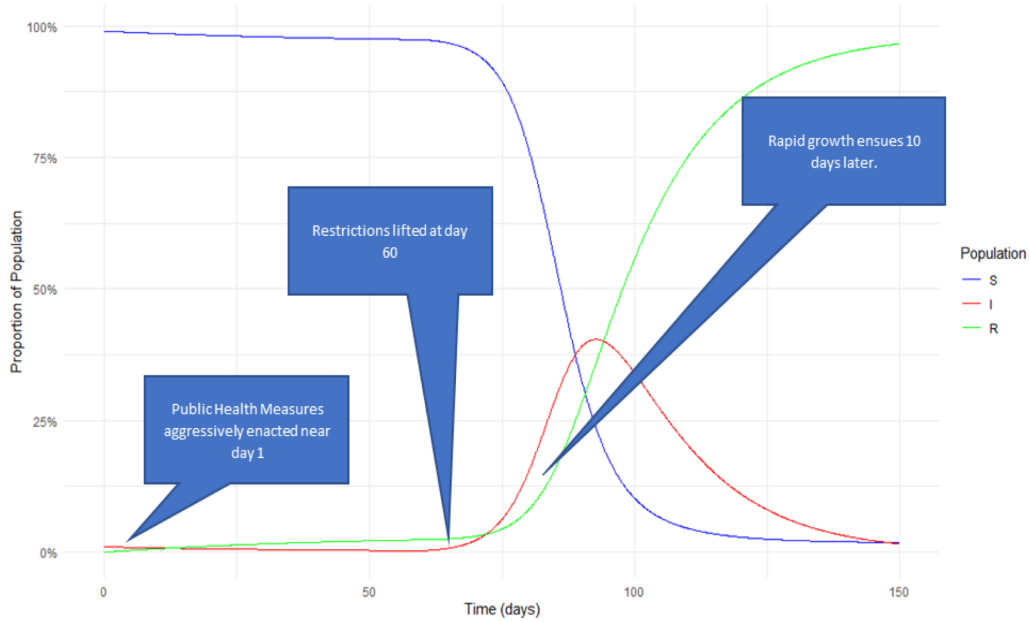
A middle case, between “fizzle” and “flash,” is the “slow burn.” Here, the reproductive number hovers right around one; keeping the infection going at a steady rate. This case may be the worst for the economy (without regard for the health of citizens) because it lasts the longest.

Conclusion: A warning

We stated above that the best case was the "fizzle" and, strictly from a consequence management perspective, the worst case is "flash," and that the difference between these two cases is largely in the way that public health measures are implemented *and adhered to* until the crisis is past. Thus, relaxing restrictions before it is safe to do so may be as bad as having had no restrictions at all.

This is the case for the plot that we use to close this chapter. In this case, stringent public health measures are in place for 60 days, and then lifted before the infection is completely eradicated. In the example below, restrictions are put in place and then lifted prematurely. We assume that in the days following the lifting of restrictions, mixing becomes higher than pre-epidemic because people are both shopping at stores that had been previously closed as well as visiting missed friends.

FIGURE 8: FIZZLE BECOMES FLASH



Public health measures are enacted around day 1. Because health officials see no strong rise in cases, release them at day 60. Infection takes hold rapidly and accelerates into the 'flash' scenario.

Now that we have discussed the mechanics of infections, we apply the principles and their public policy implications in the following Chapters: first in the immediate, tactical sense, and then in the longer-term, strategic sense.

CHAPTER 3

Operational Impacts for the Department of Defense

This chapter focuses on the current operational impacts for the Department of Defense from the COVID-19 pandemic. While the nation and the world's attention is fixed on the rapidly evolving health crisis, the priorities outlined in the 2018 National Defense Strategy (NDS) have not gone away. Long-term strategic competitions with China and Russia remain the number one priority for the department.[15] The DoD must deter and counter rogue regimes such as Iran and North Korea while defeating terrorist threats at home and abroad.[16] Although these priorities remain, the department finds itself simultaneously assisting with the nation's emergency response to the ongoing pandemic in cities and states across the country, as well as stemming the spread of the disease within its ranks. Any degradation to military readiness due to the virus, or the perception of a U.S. military with a divided attention, could create vulnerabilities that opportunistic adversaries may exploit.

Despite the global pandemic, adversaries will likely remain undeterred in achieving their own objectives.[17] Anticipating the U.S. military may have its attention focused on COVID-19, adversaries may be emboldened to seize what they view as a window of opportunity. The primary objectives for the DoD, as outlined in the NDS, include defending the homeland from attack, sustaining joint force military advantages globally and in key regions, and deterring adversaries from aggression against U.S. vital interests.[18]

15 *Summary of the 2018 National Defense Strategy of the United States of America* (Washington, DC: DoD, 2018), p. 2.

16 Ibid

17 Mujib Mashal and Najim Rahim, "Taliban Attack Afghanistan Amid Growing Coronavirus Threat," *The New York Times*, March 28, 2020, available at https://www.nytimes.com/2020/03/28/world/asia/taliban-afghanistan-coronavirus.html.

18 *Summary of the 2018 National Defense Strategy of the United States of America*, p 4.

At the same time, the DoD has a well-established, clearly defined core capability of providing humanitarian assistance and disaster relief during times of crisis.[19] Consistent with this mission, the U.S. military can provide critical assistance to the homeland during the COVID-19 pandemic. Current projections estimate that the U.S. could exceed 200,000 deaths due to the virus, even if social distancing practices remain in place for some time.[20] While the nation's medical staff, social workers, and first responders remain on the front lines, the DoD has the ability and resources to provide critical assistance in a variety of ways.

The highly contagious nature of the virus presents a risk to U.S. forces, whether conducting operations overseas, training or other routine operations, or directly participating in the COVID-19 response. The primary challenge the department faces today is balancing its missions against the risk to U.S. forces that the virus presents.

One useful construct is to evaluate "risk-to-mission" vs. "risk-to-force." For our purposes, risk-to-mission is the likelihood that forces fail to achieve their objectives. Given the stated importance of a mission, military leaders may assume more or less risk of accomplishing a mission and look to employ additional resources or controls in order to ensure mission success. Similarly, risk-to-force is the likelihood that military personnel could be harmed given a certain set of hazards or threats. Leaders typically look for ways to minimize risk-to-force while ensuring mission success.

We divide the remainder of this chapter into two parts. In the first part, we address the challenges DoD faces in supporting the objectives of the NDS, as previously discussed, in light of the COVID-19 pandemic. In the second part, we specifically address how DoD can best provide humanitarian assistance and relief to the nation during this crisis. In each of these, we examine the risk-to-mission as well as the risk-to-force that leaders must consider and balance. Given the challenge of writing about events as they are happening, we analyze steps that DoD is currently taking to these ends, as well as make recommendations for leaders to consider.

Support the objectives of the NDS

The enduring primary mission of the Department of Defense is to provide "combat-credible military forces needed to deter war and protect the security of our nation."[21] To achieve this end, leaders maintain a military that is trained and ready to respond to crises at home and abroad. It should come as no surprise that most of the methods by which the military

19 U.S. Department of Defense, *Joint Publication 3-29, Foreign Humanitarian Assistance* (Washington, DC: DoD, 2019), p. I-1.

20 The New York Times, "Coronavirus Live Updates: U.S. Deaths Could Exceed 200,000; Social Distancing Guidelines Extended," *The New York Times,* March 30, 2020, available at https://www.nytimes.com/2020/03/30/world/coronavirus-news.html.

21 *Summary of the 2018 National Defense Strategy of the United States of America,* p. 1

currently trains and maintains readiness are in direct opposition to the social distancing practices required to stop the spread of the virus. Whether aboard ships and submarines, operating aircraft, or training new recruits in boot camp, military training and readiness activities often require gathering individuals close together in tightly confined spaces.

The Spanish Flu of 1918 provides a historical perspective on the interplay between military operations and the spread of a global pandemic.[22] After the initial outbreak in the spring, experts believed that the worst was over, and the deadly disease had abated. Unfortunately, a new strain emerged in the fall of 1918 that spread rapidly during the final campaign of the first World War.[23] The mass movement of soldiers around the globe — coupled with the inherent close-quarters nature of military operations — facilitated the spread of the disease.[24] An estimated 40% of U.S. Navy personnel and 36% of the U.S. Army fell sick from the pandemic, significantly decreasing combat readiness.[25] From overcrowded transport ships to the trenches on the Western Front, the Spanish Flu accounted for the death of nearly 45,000 servicemembers — roughly half the total U.S. fatalities during WWI.[26]

COVID-19 already appears to be having an impact on current operations, training, and military readiness across the services. The two U.S. aircraft carriers operating in the Pacific are struggling to isolate COVID-19 cases onboard in order to prevent an outbreak that might spread quickly and affect scheduled training and deployed operations.[27] France, Spain, and the Netherlands have announced temporary troop withdrawals from Iraq and the continued fight against ISIS to prevent the spread of the virus within their ranks.[28] Leaders have cancelled major exercises in effort to stem outbreaks among units.[29] As cases of COVID-19 in the military have loosely followed the trajectory of the civilian population and steadily risen

22 Blake Stilwell, "Why the Spanish Flu Was Able to Kill Healthy WWI Troops," *Military.com*, available at https://www.military.com/military-life/why-spanish-flu-was-able-kill-healthy-wwi-troops.html

23 Dave Roos, "Why the Second Wave of the 1918 Spanish Flu Was So Deadly," *History.com*, March 3, 2020, available at https://www.history.com/news/spanish-flu-second-wave-resurgence

24 Military Officers Association of America, "How the Military Played a Vital Role Against the Attack of the Spanish Influenza," October 22, 2018, available at https://www.moaa.org/content/publications-and-media/news-articles/2018-news-articles/how-the-military-played-a-vital-role-against-the-attack-of-the-spanish-influenza/

25 Ibid

26 Eric Durr, "Worldwide flu outbreak killed 45,000 American Soldiers during World War I," *U.S. Army*, August 31, 2018, https://www.army.mil/article/210420/worldwide_flu_outbreak_killed_45000_american_soldiers_during_world_war_i

27 Steven Stashwick, "COVID-19 Cases Reported on Both US Aircraft Carriers in Western Pacific," *The Diplomat*, March 30, 2020, available at https://thediplomat.com/2020/03/covid-19-cases-reported-on-both-us-aircraft-carriers-in-western-pacific/

28 Nicholas Fiorenza, "Covid-19: European countries withdraw from Iraq" *Jane's Defence Weekly*, March 27, 2020, available at https://www.janes.com/article/95154/covid-19-european-countries-withdraw-from-iraq

29 Shawn Snow and Diana Stancy Correll, "Major Arctic military exercise canceled over coronavirus fears," *Military Times*, March 11, 2020, available at https://www.militarytimes.com/flashpoints/2020/03/11/major-arctic-exercise-canceled-over-coronavirus-fears/

over the past several weeks, DoD has begun to limit the amount of information it shares publicly about cases within its ranks due to operational security concerns.[30]

Military leaders have attempted to balance this risk-to-mission (i.e., maintaining operational readiness) against the risk-to-force (i.e., avoiding the spread of the virus). On the one extreme, units and military bases could simply "stand-down," maximize social distancing to prevent the spread of the virus among military ranks and accept a precipitous decline in military readiness. Unfortunately, the DoD is not designed to support this sort of an immediate halt to operations for any period of time, and the risk-to-mission for such a course of action would be significant.

Certain critical functions, such as nuclear deterrence and special operations forces, cannot suddenly stop performing their missions.[31] Fortunately, deployed SSBN nuclear deterrence patrols represent the most restrictive quarantine imaginable. USAF Global Strike Command is taking proactive distancing measures to isolate crews to maintain full capability.[32] Thus, the nuclear triad is secure.

Aviators and other personnel whose professions require currency could quickly lapse in minimum requirements that exist to allow them to operate safely. Ships and aircraft could fall into disrepair if maintenance is neglected for any significant duration. In addition to operational units, training commands — encompassing everything from basic military training for new recruits to flight school for aviators — produce a steady supply of skilled personnel as a key labor resource to the force. Little if any slack exists in military training pipelines, so disruptions to this human-capital supply chain could create future gaps in force capacity and capability. Although "hold-in-place" across the organization may be maintained for a period of time, the future "debts" — particularly in training and manning — will come due in a time with fewer slack in resources.

At the other extreme, DoD could simply continue to operate with minimal restrictions in order to preserve operational capabilities through training and readiness. Given that COVID-19 disproportionately affects older, immunocompromised individuals with pre-existing medical conditions[33] — not the primary demographic serving on active duty — an argument exists that DoD should continue to operate with minimal interruptions and let

30 Meghann Myers, "As COVID-19 cases continue to rise, the military could throttle how much information it releases," *Military Times*, March 26, 2020, available at https://www.militarytimes.com/news/your-military/2020/03/26/as-covid-19-cases-continue-to-rise-the-military-could-throttle-how-much-information-it-releases/

31 Barbara Starr, "DoD isolating critical troops and commanders to be ready in a crisis amid pandemic", *CNN*, March 30, 2020, available at https://www.cnn.com/2020/03/30/politics/us-military-special-protection-measures-coronavirus/index.html

32 Joe Pappalardo, "The Coronavirus Can't Stop America's Nukes," *Popular Mechanics*, April 1, 2020, available at www.popularmechanics.com/military/weapons/a31993907/nuclear-readiness-coronavirus/

33 Center for Disease Control and Prevention, "People who are at higher risk for severe illness," CDV.gov, accessed on March 26, 2020, available at https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html

the virus run its course through the service. This course of action, however, would not be without significant risk to the health of service members and their families.

Operating between these two extremes, the DoD has and should continue to implement strategies to mitigate both the risk-to-mission as well as the risk-to-force regarding COVID-19. Current strategies involve a combination of teleworking for certain personnel, as well as delaying movement within the force and dividing labor into sections via various means. These mitigating measures aim to limit any potential outbreaks of the disease within units to preserve the health of the force while still maintaining operational readiness. For the remainder of this part of the chapter, we will address these two mitigation strategies currently being implemented by the DoD.[34]

Remote work in the DoD

Mirroring the rest of society's effort to maximize social distancing, the DoD has largely attempted to implement teleworking protocols for the significant portion of its labor force that performs duties that could be executed remotely. Results across the force have been mixed, highlighting many of the technological, bureaucratic, and policy shortcomings within the department for teleworking.

Although some senior individuals have access to government-issued laptops and/or cell phones that provide Common Access Card (CAC) or token-enabled access to classified and unclassified networks and email, most military members do not. For the small cadre who can access Virtual Private Networks (VPNs) to conduct routine work remotely, systems have been overwhelmed. Networks that were never designed to support heavy traffic have proved inadequate to meet the demands social distancing efforts have placed upon them. In addition to these challenges the DoD is facing with teleworking, remote operations create new vulnerabilities for malicious activity such as spear phishing that potentially adversaries could exploit.

Conducting routine tasks such as meetings or general correspondence have presented challenges for the department, especially when compared to similar organizations outside of Government. Although it is not clear whether they have the security that DoD needs, the private sector has long benefited from commercially available tools, cloud-based infrastructure, and other enterprise software to seamlessly conduct operations remotely. DoD has been slow to adopt such technologies. Strained information technology infrastructure and limited DoD approved software has presented challenges[35] for the workforce during the crisis.

34 This section is largely derived from personal correspondence between the authors and members of the DoD.

35 Katie Bo Williams, and Marcus Weisgerber. "Military Leaders Ask to Delay Budget Planning To Focus on Coronavirus, Let Staff Stay Home," *Defense One*, March 28, 2020, available at www.defenseone.com/threats/2020/03/military-pentagon-delay-budget-planning-coronavirus/164187/?oref=d-topstory.

Current DoD policies[36] largely prohibit the use of commercial applications — even for routine, unclassified work. Leaders within the department are struggling to find the resources available to work remotely.[37] Fortunately, this is a problem that may be addressed by a policy — not acquisition — solution. In Chapter 4, we will further address these concerns regarding future implications for the department. This remains an area that warrants in-depth study.

Allocating the workforce

Although the DoD has encouraged teleworking to the maximum extent possible, many of the tasks required to maintain military readiness simply cannot be performed remotely. Aircraft, ships, and other combat systems require continuous maintenance in order to maintain readiness. In Chapter 4, we will address the need for the DoD to develop and implement capabilities to train and maintain operational readiness from separate, remote locations. Those solutions, however, do not immediately address the current challenge of maintaining military readiness to support the objectives of the NDS — defending the homeland from attack, sustaining joint force military advantages globally and in key regions, and deterring adversaries from aggression against U.S. vital interests — while balancing the risk-to-force.

Leaders within DoD have taken steps to minimize the spread of the virus throughout military units. In addition to the standard travel restrictions, leaders have enacted "stop movement" orders that essentially limit Personal Change of Station (PCS) orders, exercises, and deployments until the middle of May.[38] Although these orders temporarily reduce the risk-to-force, they cannot remain in place for long without hurting operational readiness. As discussed in the previous chapter, if leaders lift mitigation efforts too soon, the "fizzle" scenario could quickly turn into a "flash" with catastrophic impact.

At the operational and tactical unit level, military leaders are implementing a variety of measures to maintain readiness while mitigating the risk of an outbreak. In addition to encouraging teleworking when possible and implementing distancing measures at work, many units have shifted to multiple independant sections to minimize the spread within an entire unit. Depending on the size, type, and mission of a given military organization, some have chosen to execute 2-shift operations, disinfecting all surfaces in between and separating the shifts by one hour so that no members come in contact with anyone from the previous shift. Other units have continued to operate and train with half manpower while

36 U.S. Department of Defense, *DoD Instruction 8170.01, Online Information Management and Electronic Messaging*, (Washington, DC: DoD, 2019).

37 Harrison Schramm, Kevin Chlan, and Peter Kouretsos, "The Military Response to COVID-19: Create JTF COVID," *Defense One*, March 28, 2020, available at https://www.realcleardefense.com/articles/2020/03/28/the_military_response_to_covid-19_create_jtf_covid_115154.html

38 Jared Serbu, "90,000 more military personnel told to stay put under latest coronavirus restrictions," *Federal News Network*, March 26, 2020, available at https://federalnewsnetwork.com/defense-news/2020/03/90000-more-military-personnel-told-to-stay-put-under-latest-coronavirus-restrictions/

the other half works remotely, switching roles after two weeks. Neither of these options is ideal for building or sustaining military readiness for any duration, but they may help strike a balance between the risk-to-mission and risk-to-force in the short term.

As COVID-19 testing becomes more widespread and available across the country with faster results, the DoD needs to consider how it can start mitigating risk-to-force through more aggressive testing and other measures. While leaders in the department can implement policy that could make remote work more productive in the short term, current mitigation efforts will have a long-term detrimental impact on readiness if they remain in place for any significant duration. Leaders should continue to pursue methods to mitigate this risk of infection such as social distancing to the extent practicable as well as limiting non-essential workers contact with the deployable force while simultaneously increasing the readiness of the force in order to meet the challenging demands outlined in the NDS.

Fight the pandemic

Moving beyond the DoD's primary mission of supporting the objectives outlined in the NDS, the next challenge for leaders is to determine how much and what type of assistance the military should provide to combat the COVID-19 pandemic. This is further complicated when we fold the National Guard into the equation, which is responsible jointly to the overall department but also accountable to state governors.[39] For the remainder of this chapter, we will broadly address ongoing efforts the DoD is taking to combat COVID-19.

The first challenge in determining how to balance risk-to-mission against risk-to-force in regard to COVID-19 is deciding exactly what mission (or missions) the department can and should perform during the crisis. Notable ongoing missions[40] include:

- USNS *Mercy* and USNS *Comfort* deployments, providing additional hospital beds and medical support.
- U.S. Army Corps of Engineers converting hotels and dormitories into makeshift hospitals.
- USAF transport aircraft moving supplies into areas in need.
- National Guard soldiers and airmen providing civil and law enforcement support to local areas under the control of the governor.

Although each region, state, and city have different needs given the nature of the crisis, a series of independent efforts will simultaneously strain common resources while missing efficiencies that a coordinated effort would leverage. A unified federal effort is required to

39 Harrison Schramm, Kevin Chlan, and Peter Kouretsos, "The Military Response to COVID-19: Create JTF COVID," *Defense One*, March 28, 2020, available at https://www.realcleardefense.com/articles/2020/03/28/the_military_response_to_covid-19_create_jtf_covid_115154.html

40 Ibid

better coordinate and use the nation's 1.2 million active duty service members and 800,000 reservists to assist in the response.[41]

Fortunately, the United States has a tried-and-true playbook for unifying efforts in crises such as this — the Joint Task Force (JTF). Establishing a JTF under the national Coronavirus Task Force would integrate the activities of military operations, unify command, and coordinate effort. Governors should maintain control over their state's National Guard to coordinate with other local functions, such as public schools or law enforcement, but could leverage the JTF to coordinate the overall federal response as necessary.[42]

The U.S. military has a long, proven history of establishing a JTF when the "scope, complexity, or other factors of an operation require the capabilities of services from at least two military departments ."[43] Once established, its commander directs operations by assigning missions to apportioned forces, prioritizing and allocating military resources, and assessing and taking risks.[44] The JTF commander would be responsible for clearly defining DoD's mission in regards to the COVID-19 response, requesting and apportioning appropriate forces to conduct missions, and balancing risk-to-mission against risk-to-force throughout the operation.

The U.S. response to the Tōhoku earthquake and tsunami and Fukushima nuclear disaster (Operation Tomodachi) provides a recent example of quickly standing up a JTF in response to a crisis.[45] Three days after a massive earthquake and tsunami struck Japan, killing and displacing thousands and damaging the Fukushima nuclear power plant, U.S. Pacific Command (PACOM) established two separate Joint Task Forces (JTF-505 and JTF-519) to coordinate various aspects of U.S. military, government, and non-government operations.[46] The combination of a traditional humanitarian and natural disaster with a nuclear disaster made Operation Tomodachi all the more challenging. But when the operation was completed 42 days later, the military response had involved more than 24,000 servicemembers, 189 aircraft, and 24 naval ships.[47] The coordinated military effort undoubtedly saved countless lives. The JTF was a critical aspect of the military command structure that enabled this disaster relief operation to be conducted so effectively.

41 Ibid

42 Ibid

43 U.S. Department of Defense, *Joint Publication 3-33, Joint Task Force Headquarters* (Washington, DC: DoD, 2018), xi.

44 Ibid, xvi

45 Rockie Wilson, "Operation TOMODACHI: A Model for American Disaster Response Efforts and the Collective use of Military Forces Abroad," *Journal of Defense Management*, 02, 2012, DOI: 10.4172/2167-0374.1000108.

46 Ibid

47 Ibid

Closer to home, the coordinated government response to Hurricane Katrina demonstrated the efficacy of establishing a joint military command structure.[48] Although individual governors maintained control of National Guard forces, the JTF under LTG Honore established unity of effort, apportioned resources, and set priorities for the response.[49]

There are key similarities between the responses required for the Fukushima nuclear disaster, Hurricane Katrina, and the COVID-19 crisis. Each was unprecedented in recent times, although arguably, the current crisis has given leaders ample time to think about and prepare for an appropriate response. Bringing together the worst attributes of these events, COVID-19 presents a biologically dangerous vector on American soil.

In addition to coordinating the missions already being performed by the DoD, a JTF could help facilitate other missions and capabilities the U.S. military is well-suited to provide, including:

- Leading government and non-government interagency cooperation[50]
- Providing a flexible and motivated workforce
- Assisting with medical research[51]
- Leveraging existing industrial capacity
- Providing support to logistics and critical infrastructure

Summary

Citizens expect that the Department of Defense will protect them and the nation's vital interests. COVID-19 shows a case where protection is not a clear concept, and a balance needs to be struck between what is happening inside the nation's borders against what is happening overseas.

48 Roberta Berthelot, "The Army response to Hurricane Katrina," *U.S. Army*, September 10, 2010, available at https://www.army.mil/article/45029/the_army_response_to_hurricane_katrina

49 Ibid

50 James Stavridis, "What Can the U.S. Military Do to Help Fight the Pandemic?" *TIME*, March 23, 2020, available at https://time.com/5808410/u-s-military-fight-coronavirus-pandemic/

51 Ibid

CHAPTER 4

Future Implications

In Chapter 2 of this monograph, we examined the mathematical theory and its implications for policy choices facing leaders in the current COVID-19 pandemic. In Chapter 3, we considered the immediate- and near- term impacts on the U.S. Department of Defense. In this final Chapter, we consider the longer-term impact of COVID-19 on the U.S. Department of Defense and American society.

If COVID-19 were a war vice a pandemic, it would be a major one for the United States. In the Second World War, the United States lost an estimated total of 418,000 citizen-soldiers out of a population of 132.2 million.[52] In Vietnam, the U.S. lost a little over 58,000 military personnel,[53] and OIF/OEF combined are slightly under 5,000 casualties.[54] While it is too soon to say — and our ongoing actions at press time will play a large role — it is certainly credible that COVID-19 will find its place among these events; some researchers expect the US death toll to reach as high as 200,000 by July.[55] A key difference between COVID-19 and the other events is that the wars hit hardest the demographics of military service — young and disproportionally male — while the virus is indiscriminate in who it infects and our estimates at this time are that it tends to be more fatal to older individuals.

52 United States Census Bureau, "A look at the 1940s Census," accessed April 6, 2020 available at https://www.census.gov/newsroom/cspan/1940census/CSPAN_1940slides.pdf; The National World War II Museum, "Research Starters: Worldwide Deaths in World War II,", accessed April 6, 2020, available at https://www.nationalww2museum.org/students-teachers/student-resources/research-starters/research-starters-worldwide-deaths-world-war.

53 National Archives and Records Administration, "Military Records: Vietnam War US Military Fatal Casualty Statistics" accessed April 2, 2020, available at https://www.archives.gov/research/military/vietnam-war/casualty-statistics

54 United States Department of Defense, "Immediate Release: Casualty Status, as of 10 a.m. EDT March 30, 2020," Defense.gov, accessed April 1, 2020, available at https://www.defense.gov/casualty.pdf

55 The Economist, "COVID-19's death toll appears higher than official figures suggest," April 4, 2020, available at https://www.economist.com/graphic-detail/2020/04/03/covid-19s-death-toll-appears-higher-than-official-figures-suggest

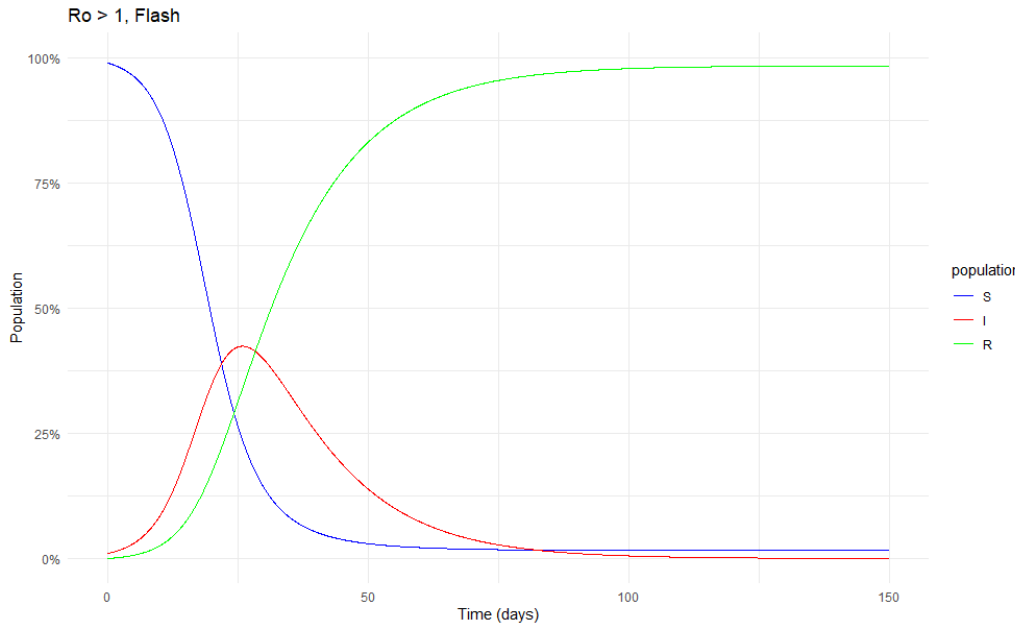
How COVID-19 ends

How this epidemic ends depends on what we do now, what we do in the coming weeks and months, and in some sense on the virus. At this time, we are unsure even how to define the end; one candidate measure would be the GDP reaching 90% of what it was pre-COVID. Although it is difficult to know how the epidemic will end while it rages, there are at least two boundary cases worth considering:

The Disaster Case — "Flash"

This is an extreme case which corresponds to the "Flash" epidemic of Chapter 2 (Figure 9), where the epidemic spreads despite controls, eventually killing twice the current upper estimate — 400,000 Americans. For historical perspective, this is nearly the number of Americans lost in the Second World War. Although this case remains possible — particularly should controls be released prematurely — the opposite of social distancing could occur, reigniting the spread of the virus. This should serve as a compelling case for restrictions to be relaxed slowly. The true impact of this loss will be felt both in the productivity of the individuals themselves and the consequent impact on society.

FIGURE 9: "FLASH" CASE, REVISITED

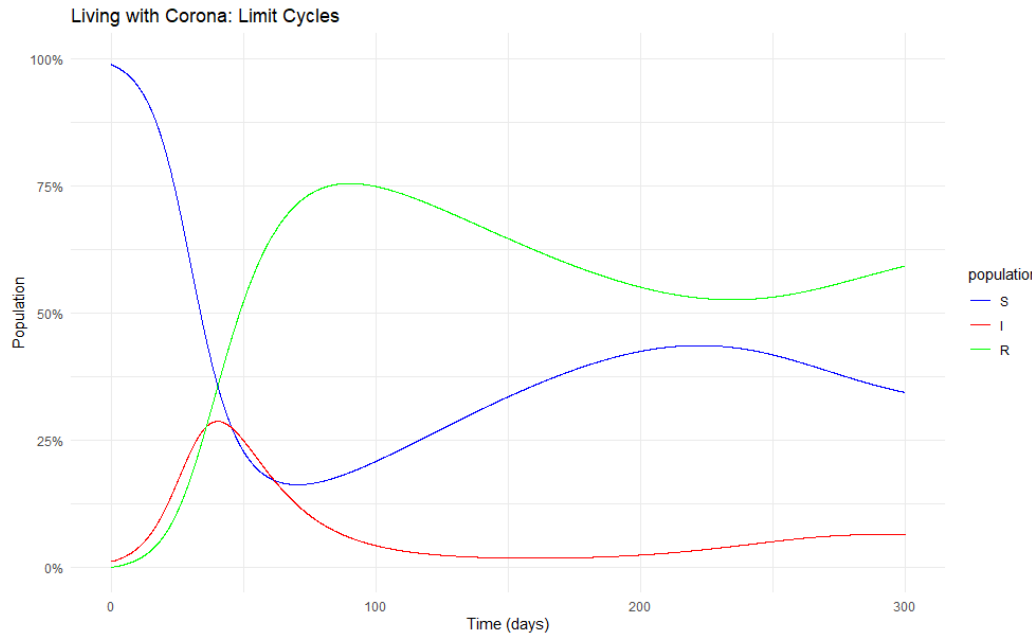


The new normal — Living with COVID-19

It is possible that after this initial round, COVID-19 will become part of humanity's battle against disease writ large, and that we will have cyclical outbreaks and responses for the foreseeable future (Figure 10). This would place it in a similar category as seasonal influenza. Although influenza is not widely regarded as a public health emergency in the popular

press to date, it does account for an estimated 6-12 thousand deaths annually in the United States.[56] In this scenario, each year Coronavirus would simply be another part of the annual cycle, although it should be noted that — at press time — the disease appears to be far more contagious and deadly than any current, seasonal cycle. It would be a tough pill to swallow if it became "the new normal."

FIGURE 10: "NEW NORMAL" OF CYCLICAL OUTBREAKS



How will the Department of Defense change due to COVID-19?

Here we pause to reflect on the lessons we have learned (to date) about COVID-19, epidemics writ large in the world, and estimate some of their future implications.

There is no longer any such thing as a "localized epidemic." Although the initial action of the disease was centered in Wuhan, China, the virus was permitted to spread beyond its borders very rapidly after it was first detected before the Chinese Communist Party (CCP) took any serious actions. But the rapid spread of COVID-19 speaks more broadly to the interconnectedness of our world transportation and global supply infrastructure.

56 Center for Disease Control and Prevention "Influenza Burden," Accessed April 6, 2020 https://www.cdc.gov/flu/about/burden/index.html

Until recently, air travel between the United States and the rest of the world moved nearly 23 million passengers annually.[57]

The world is interconnected today and is likely to remain so for the near future. However, the seeds for a larger economic decoupling — particularly between the U.S. and China — have already been planted in the technology, science, and financial sectors well before the COVID-19 outbreak. U.S. corporations and the U.S. government will face hard choices on the risks of relying on China to be the world's factory and face pressures to repatriate businesses and production. However, the extent to which this will curb cooperation and exchange in other areas cannot yet be determined.

"Distributed operations" is a form of "social distancing." New and emerging U.S. military operating concepts, such as the Army and Air Force's Multidomain Operations, Navy's Distributed Maritime Operations, and DARPA's future Mosaic Warfare concept emphasize disaggregated, distributed units with varying degrees of connectivity conducting operations across the battlespace. These changes were motivated by adversary strategies and capabilities which threaten the current U.S. operating model, namely, responding to threats by assembling large concentrations of forces nearby and conducting uncontested operations. An unintended but worthy side-effect in light of the COVID-19 pandemic is that reducing the density of large gatherings of soldiers, surface ships, or aircraft that can be exploited by the threat as achieves many of the aims of "social distancing." However, in order to be effective, a physically distributed military force will need to be able to coordinate and concentrate its effects.[58]

"Distributed operations" no longer only applies to just the military. The U.S. military isn't the only organization trying to implement distributed operations. COVID-19 has put all American society — to include DoD — through a first of its kind remote work / offsite drill. Simulations preparing for situations where employees cannot access secure facilities were conducted in the past, but the lessons have not been fully digested and implemented.[59] Instead, it is now being done ad hoc in real time. As the situation develops, more will be known but currently, most sources agree that the pandemic has exposed the

57 U.S. Department of Transportation, *U.S. International Air Passenger and Freight Statistics*, June 2019 (Released February 2020), available at https://www.transportation.gov/sites/dot.gov/files/2020-02/US%20International%20Air%20Passenger%20and%20Freight%20Statistics%20for%20June%202019.pdf

58 "If a distributed force is not connected, it will be defeated in detail." Dmitry Filipoff, *A Conversation with Trip Barber on Fleet Design, Budget Analysis, and Future Warfighting*, CIMSEC, February 18, 2020 available at http://cimsec.org/a-conversation-with-trip-barber-on-fleet-design-budget-analysis-and-future-warfighting/43045.; "Coordinated properly, the joint force could achieve the virtues of mass without the vulnerabilities of concentration by spreading its combat power over many smaller points of operation rather than focusing it in a few bigger bases ." Thomas G. Mahnken, et al., *Tightening the Chain: Implementing a Strategy of Maritime Pressure in the Western Pacific*, (Washington, DC: Center for Strategic and Budgetary Assessments 2019), available at https://csbaonline.org/research/publications/implementing-a-strategy-of-maritime-pressure-in-the-western-pacific.

59 Marcus Weisgerber, "When Your Work Is Classified, 'Work From Home' Doesn't Work," *Defense One*, March 13, 2020. available at https://www.defenseone.com/business/2020/03/when-your-work-classified-work-home-doesnt-work/163782/?oref=d1-related-article

weaknesses in the DoD's attitude towards computing architecture, specifically the trade of risk vs. benefit. Prior to COVID-19, the incentives for allowing greater remote access were ephemeral and focused mainly on employee satisfaction while the disincentives from a security and productivity point of view were clear.[60] The current crisis has given decisionmakers a demonstrative case where the ability to remote-in is useful and necessary. The DoD could build on its CIO-led 2019 Digital Modernization Strategy to include updated best practices and incentives for greater remote access.[61] Additionally, the department should implement lessons from private industry — weighing the benefits of remote work for certain positions as well as the utility of commercially available software and services. The overall goal should be to modernize policy and increase the overall productivity, efficiency, and resilience of the workforce.

COVID-19 is forcing knowledge workers and their organizations to explore this form of collaboration. When the current crisis is over, it is unlikely that every office worker will return to full time on-site work. The advantages to encouraging remote work — even if it is only a few days a week — will immediately be felt by reduced congestion and pollution in major cities. It will also be reflected by reducing the United States' dependence on oil. We leave understanding of how this will affect world oil markets and U.S. commitments overseas to future research.

New methods and media for training are needed. The COVID-19 pandemic has raised questions about the crisis' longer-lasting impact on military readiness.[62] Indeed, training and exercises are key metrics to determine a unit's readiness and effectiveness and virtual training will be an important part of the solution.[63] The Army modified its much-anticipated Defender 20 Europe, an exercise originally planned to test the Army's ability to deliver a division-sized force from the United States to Europe.[64] More recently, the USS

60 Peter Finn and Sari Horwitz, "US charges Snowden with espionage," *Washington Post*, June 21, 2013, available at https://www.washingtonpost.com/world/national-security/us-charges-snowden-with-espionage/2013/06/21/507497d8-dab1-11e2-a016-92547bf094cc_story.html

61 The DoD Digital Modernization Strategy presents the DoD Chief Information Officer's (DoD CIO) vision for achieving the Department's goals and creating "a more secure, coordinated, seamless, transparent, and cost-effective IT architecture that transforms data into actionable information and ensures dependable mission execution in the face of a persistent cyber threat," See U.S. Department of Defense, *DoD Digital Modernization Strategy: DoD Information Resource Strategic Plan FY19-23,* (Washington, DC: DoD, 2019), available at https://media.defense.gov/2019/Jul/12/2002156622/-1/-1/1/DOD-DIGITAL-MODERNIZATION-STRATEGY-2019.PDF

62 Bryan Bender, "The Pentagon's big problem: How to prepare for war during a pandemic," *Politico*, March 27, 2020, available at https://www.politico.com/news/2020/03/27/pentagon-military-coronavirus-pandemic-152575

63 Jennifer McArdle, Thomas Kehr, and George Colabatistto "Pandemics and the Future of Military Training," *War on the Rocks*, March 26, 2020, available at https://warontherocks.com/2020/03/pandemics-and-the-future-of-military-training/

64 Strategically, the exercise also intended to act as a vector check for the Army's ability to conduct operations consistent with the U.S. National Defense Strategy and stress test elements of its new Multi-Domain Operations concept. See Jen Judson, "COVID-19 dampens European exercise, but US Army chief says all is not lost" *Defense News*, March 18, 2020, available at https://www.defensenews.com/smr/army-modernization/2020/03/18/covid-19-dampens-european-exercise-but-army-chief-says-all-is-not-lost/

Theodore Roosevelt (CVN-71) was ordered to remain at Guam to have all sailors tested for the virus. Longer term, other analysts are concerned about the implications for boot camp and basic training, given how much the military relies on new recruits.[65]

Fortunately, there are technology solutions that can address current and future training and readiness challenges. DoD is in the midst of developing Live, Virtual, and Constructive (LVC) training for a wide range of missions and capabilities, especially in the air, cyber, and electromagnetic domains. LVC offers solutions for many training deficiencies, including airspace and range limitations, accurate threat simulation, and protecting sensitive capabilities from collection. The department's efforts to fully implement LVC training have been slow to date. The COVID-19 pandemic could serve as a forcing function to more broadly implement LVC simulation and training across the services, increasing the ability of the force to train for multi-domain operations against a peer adversary from distributed locations.[66]

In the absence of a compelling case for resilience, efficiency has become the metric across a broad range of areas in the DoD. For several decades, the case for efficiency has been clear, while the case for resilience has been theoretical. We should take advantage of this moment and use the current behaviors around COVID-19 as a proxy for other events that might stress resilience. Although panic buying of toilet paper in the U.S. may appear somewhat comical, the problem that it reveals is real; specifically, that if asked beforehand, few logistics efforts would have identified it as a "panic supply." Our question looking forward is "what are the low volume, high demand" assets within the U.S. military's logistics network? Is it munitions stockpiles, rare earth minerals, or something completely unseen? The production of critical materials is more globally dispersed, just as the global competition for raw materials is increasing. Moreover, the U.S. military is more dependent on civilian industry, the latter of which depends more on just-in-time production and delivery practices.[67]

The security environment and defense scenarios already outlined in the National Defense Strategy and other strategy and planning documents have significant implications for the kinds of military systems the joint force should use, in addition to the stockpiling of other critical equipment and materials. Great power adversaries may target key nodes in the U.S. supply chain and disrupt its global operations in times of tension or conflict. These

65 Michael M. Phillips, Ben Kesling, and Michael R. Gordon, "Coronavirus Pandemic Has Army Paying Recruits Even Before Boot Camp," *The Wall Street Journal*, March 28, 2020, available at https://www.wsj.com/articles/coronavirus-pandemic-has-army-paying-recruits-even-before-boot-camp-11585415532.

66 However, the DoD is not currently organized to carry out LVC training at scale. See Jennifer McArdle, *Victory Over and Across Domains: Training For Tomorrow's Battlefields* (Washington, DC: Center for Strategic and Budgetary Assessments ,2019), available at https://csbaonline.org/research/publications/victory-over-and-across-domains-training-for-tomorrows-battlefields.

67 National Research Council, *Managing Materials for a Twenty-first Century Military,* (Washington, DC: The National Academies Press, 2008), available at https://doi.org/10.17226/12028.

challenges are not new. However, they should be reflected in future stockpile analysis as part of a DoD-wide assessment of its materials supply chain. This would align directly with NDS directives to "prioritize prepositioned forward stocks and munitions, strategic mobility assets, partner and allied support, as well as non-commercially dependent distributed logistics and maintenance ."[68]

Impact on Defense Budgets

Last year the Trump Administration agreed to a two-year budget deal that raised the debt ceiling and funded defense and domestic programs enough to thwart a government shutdown and appease lawmakers on both sides of the aisle. The most recent budget request (FY 21) asks for $4.829 trillion, $740.5 billion of which will go to national defense - $704.5 of which will fund the DoD base budget and OCO (Table 1).[69] According to the Congressional Budget Office (CBO), the deficit under the President's request is expected reach $11 trillion over the next ten years, rising from $984 billion in 2019 to $1.4 trillion by 2030.[70]

TABLE 1: NATIONAL DEFENSE DISCRETIONARY BUDGET AUTHORITY IN PRESIDENT'S BUDGET REQUEST, FY19 TO FY25

	FY 19 enacted	FY 20 enacted	FY 21 requested	FY 22 projected	FY 23 projected	FY 24 projected	FY 25 projected
Total, Department of Defense-Military (051)	685	713	705	722	737	753	768
Atomic energy defense activities (053)	22	24	26	27	27	28	28
Defense-related activities (054)	9	9	9	10	11	11	11
Total, National Defense Discretionary (050)	**716**	**746**	**741**	**759**	**775**	**791**	**808**

In billions nomial $. Totals might not add due to rounding. Data from OUSD(C), CFO, *United States Department of Defense Fiscal Year 2021 Budget Request*, Defense Budget Overview, *Figure 1. Department of Defense Budget*, Future Year projections derived from Office of Management and Budget, *A Budget for America's Future: Budget of the U.S. Government, Fiscal Year 2021*, Table S-7. Proposed Discretionary Funding Levels in 2021 Budget, and OMB, *Analytical Perspectives, Table 24-1 Policy Net Budget Authority by Function, Category, and Program.*

All of this was before the United States' economic and financial outlook changed as a result of the COVID-19 pandemic. President Trump recently signed a bipartisan $2 trillion economic relief plan in response to the public health emergency and economic fallout, and more funds may be on the way.[71] Prior to COVID-19 and the stimulus response, DoD was already being funded below the level necessary to support the National Defense Strategy. According to former Secretary of Defense James Mattis and former Chairman of the Joint

68 *Summary of the 2018 National Defense Strategy of the United States of America*, 7.

69 Office of Management and Budget, *A Budget for America's Future: Budget of the U.S. Government, Fiscal Year 2021,* February 2020, available at https://www.whitehouse.gov/wp-content/uploads/2020/02/budget_fy21.pdf; OUSD(C), CFO, *United States Department of Defense Fiscal Year 2021 Budget Request*, February 2020, available at https://comptroller.defense.gov/Portals/45/Documents/defbudget/fy2021/fy2021_Budget_Request_Overview_Book.pdf

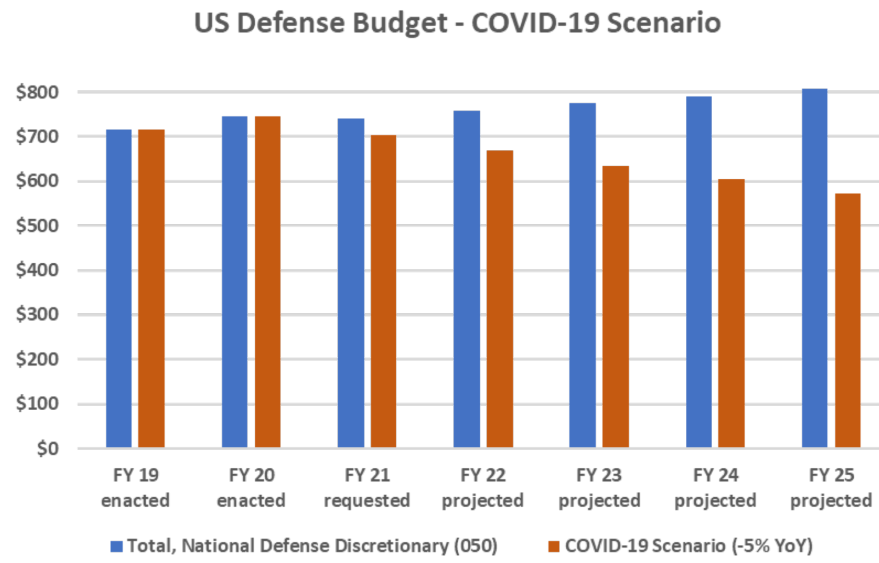
70 Congressional Budget Office, *An Analysis of the President's 2021 Budget*, (Washington, DC: Congressional Budget Office, 2020) available at https://www.cbo.gov/system/files/2020-03/56278-CBO-APB-2021.pdf.

71 Rebecca Shabad and Adam Edelman, "Trump signs $2 trillion coronavirus stimulus bill," *NBC*, March 27, 2020, available at https://www.nbcnews.com/politics/congress/house-gives-final-passage-2-trillion-coronavirus-stimulus-bill-n1170281

Chiefs of Staff General Joseph Dunford, DoD's base budget required 3-5% real growth each year to compete effectively against China and Russia.[72] In 2018, the congressionally mandated NDS Commission endorsed the 3–5% benchmark.[73]

The current budget trends before COVID-19 were already not on track to support the NDS,[74] with relatively flat budgets in the best-case scenario. Now we have a potential "worst-case." Americans questioning how much the United States spends on defense and why it does so is not new. However, criticism of the billions in defense spending not adequately protecting us from a public health emergency could pressure lawmakers to spend more on healthcare, infrastructure, and other domestic needs, and look for cuts in DoD to help pay the bill. If the United States follows the pattern of most recessions, including the one after the 2008 financial crisis, large cuts to real expenditure — defense and non-defense alike — is a serious possibility. Estimates of the extent of these cuts are unknown, but below is what even a notional 5 percent year-on-year cut would look like.

FIGURE 11: A COMPARISON OF FY21 BUDGET SUBMISSION AND 5% CUT



72 Aaron Mehta, "DoD Needs 3–5 Percent Annual Growth through 2023, Top Officials Say," *Defense News*, June 13, 2017, available at https://www.defensenews.com/pentagon/2017/06/13/dod-needs-3-5-percent-annual-growth-through-2023-top-officials-say/.

73 NDS Commission, *Providing for the Common Defense: The Assessment and Recommendations of the National Defense Strategy Commission* (Washington, DC: United States Institute of Peace, 2018), p. xii. available at https://www.usip.org/sites/default/files/2018-11/providing-for-the-common-defense.pdf.

74 Travis Sharp, *Did Dollars Follow Strategy?: Analysis of the 2020 Defense Budget Request*, (Washington, DC: Center for Strategic and Budgetary Assessments, 2019), available at https://csbaonline.org/uploads/documents/FY_2020_Budget_WEB.pdf; Rick Berger and Mackenzie Eaglen, "'Hard Choices' and Strategic Insolvency: Where the National Defense Strategy Falls Short," *War on the Rocks*, May 16, 2019, available at https://warontherocks.com/2019/05/hard-choices-and-strategic-insolvency-where-the-national-defense-strategy-falls-short/.

Another consideration is that future defense spending could be reallocated as leaders and the public rethink the U.S. approach to national defense.[75] For example, hospital ships and transport assets are in the public eye and are more useful to respond to disasters and pandemics; fighter aircraft are not.[76] However, as with previous budgets, Operations and Maintenance and MILPERS accounts are expected to take up a larger share of current and future budgets; moreover, flat or declining defense budgets were already expected by the Services and independent researchers before COVID-19.[77] For example, Marine Corps Commandant General David Berger last year commented that flat or declining budgets are baked into his vision of the future Marine Corps: "Our assumption, my assumption is flat or declining [defense budgets] in a nut shell, not rising. If [an increase] happens, great. But this is all built on, based on flat or declining [budgets]." Earlier this year Secretary of Defense Mark Esper issued a DoD-wide memorandum calling for "ruthless prioritization" and organizational-wide reviews to free up money to put toward the National Defense Strategy.[78] Those reviews are likely to intensify given the possible future budgetary outlook.

Acknowledging the current era of Great Power Competition, the current geopolitical landscape has fundamentally changed and is far more perilous than during the Great Recession over a decade ago. The true future implications of the COVID-19 pandemic on defense spending remain unknown and warrant detailed further study.

75 Max Boot, "COVID-19 is killing off our traditional notions of national defense," *Washington Post,* March 31, 2020 available at https://www.washingtonpost.com/opinions/2020/03/31/covid-19-is-killing-off-our-traditional-notions-national-defense/?arc404=true.

76 This internal reshuffling of priorities could go several different ways, perhaps even towards more medically focused areas and logistics. This would, ironically, implement some of the shipbuilding and logistics focused investments that CSBA has argued for over the past several years, but may steer funds away from critical research and development, modernization, and procurement priorities. See Bryan Clark, Timothy A. Walton, Adam Lemon, *Strengthening the U.S. Defense Maritime Industrial Base: A Plan to Improve Maritime Industry's Contribution to National Security* (Washington, DC: Center for Strategic and Budgetary Assessments, 2020), available at https://csbaonline.org/research/publications/strengthening-the-u.s-defense-maritime-industrial-base-a-plan-to-improve-maritime-industrys-contribution-to-national-security. Timothy A. Walton, Harrison Schramm, Ryan Boone, *Sustaining the Fight: Resilient Maritime Logistics for a New Era* (Washington, DC: Center for Strategic and Budgetary Assessments, 2019), available at https://csbaonline.org/research/publications/sustaining-the-fight-resilient-maritime-logistics-for-a-new-era.

77 Harrison Schramm, "Three Postcards from Military Manpower," *Proceedings of the U.S. Naval Institute*, January 2020, available at https://www.usni.org/magazines/proceedings/2020/january/three-postcards-military-manpower; Congressional Budget Office, *Long-Term Implications of the 2020 Future Years Defense Program* (Washington, DC: Congressional Budget Office, 2019) available at https://www.cbo.gov/system/files/2019-08/55500-CBO-2020-FYDP_0.pdf; Mallory Shelbourne, "Berger: Marine Corps moving ahead under premise of 'flat or declining' defense budgets," *Inside Defense*, October 3, 2019, available at https://ww.insidedefense.com/daily-news/berger-marine-corps-moving-ahead-under-premise-flat-or-declining-defense-budgets.

78 Mark T. Esper, *Memorandum for the Record, Department of Defense Reform Focus in 2020*, (Washington, DC: DoD, 2020), available at https://federalnewsnetwork.com/wp-content/uploads/2020/01/010620_esper_2020_reforms_memo.pdf

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