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The Evidence and Tradeoffs for a "Stay-at-Home" Pandemic Response: A multidisciplinary review examining the medical, psychological, economic and political impact of "Stay-at-Home" implementation in America

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BACKGROUND

The Coronavirus Disease 2019 (COVID-19) pandemic is sweeping our nation and the world, disproportionately affecting our most vulnerable citizens and communities. The pandemic death toll is rising, with over 110,000 deaths worldwide and over 20,000 in the United States as of mid-April. The virus kills sporadically, affecting everyone— but the aging, the chronically ill, the cognitively impaired, communities of color, and communities with less access to medical care are especially vulnerable.

Responding to an early pandemic is done with centralized rapid testing, contact tracing, and treatment, as well as rapid isolation of infected individuals and people who came in contact with them. But we are now in the midst of an established pandemic that requires a different approach. Massive self-quarantining is essential to slow the spread of the virus and to prevent overloading the healthcare system, at least until a treatment or vaccine is developed.

Trials for COVID-19 treatments are underway around the world, but there is still no treatment that is backed by high-quality evidence. By summer, we hope to identify effective medical treatments. By next year, we hope to find a safe and effective vaccine. In order to reach herd immunity, around 70-80% of the population needs to be immune to the virus — either through exposure and recovery or through vaccination. Until then, slowing the spread of the disease requires non-pharmaceutical interventions (NPIs) like physical distancing. Targeted quarantine policies that apply only to those who are infected or have been exposed to the virus would be less costly, but require testing capacity far beyond what is currently available in the United States. As such, stay-at-home orders will remain our best tool for slowing the pandemic in the near future.

About 90% of the United States is currently under "stay-at-home" orders, but as the pandemic grows in areas that have responded more slowly, we risk rapid reinfection of the rest of the nation. We also face the fact that patients, families, and communities are struggling with the economic and psychological burden of stay-at-home directives. The costs of the pandemic and associated public health responses are mounting, raising the question of whether the benefits outweigh the price.

In this review, we take a multidisciplinary approach to analyze the costs and benefits of continued stay-at-home policies. We highlight evidence from medicine, law, economics, psychology, and political science. We explain the basics of the epidemiology of pandemic spread and examine the efficacy of sheltering in place with current and historical data. We consider the effects of stay-at-home policies on mental health, the economy, and politics. We address barriers to implementation and present a framework for how stay-at-home can be implemented in a way that minimizes disruption to the American people while addressing this urgent public health crisis. We provide references to the original research and other resources. To our knowledge, this review is the most extensive survey of the literature on COVID-19 to date.

We find that it is critical for the nation to move in unison, to stay at home now, and to work together when restrictions are lifted to prevent a second wave of death and economic destruction. While there are economic and social costs to stay-at-home policies, they are far outweighed by the benefits. Areas that have responded slowly thus far should take more aggressive public health responses. Ending stay-at-home orders prematurely will risk a second outbreak —costing many lives— and will likely cause a deep, persistent recession.

METHODS

Three months into the global 2020 COVID-19 pandemic, we brought together a multi-disciplinary team of graduate students, librarians, and faculty in medicine, law, public policy, economics, messaging/design, and communication to answer the question: "Is a national 'Stay-at-Home' initiative effective, and if so, at what cost?" The team reviewed the literature and synthesized key messages. Each subsection was independently reviewed by 2 leading faculty in each field to ensure accuracy and balanced perspectives.

EPIDEMIOLOGY and US TRANSMISSION

COVID-19, the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), first emerged in December 2019 in Wuhan, China, and spread rapidly through a local food market. In January 2020, the World Health Organization (WHO) characterized the outbreak as a public health emergency. As of April 13, 2020, there have been over 1.7 million confirmed cases, including over 110,000 deaths, in 213 countries.[1] The United States (US) reported its first confirmed case of COVID-19 in January 2020.[2] The US now has the most COVID-19 cases in the world, with over 500,000 cases reported in all 50 states.[3]

SARS-CoV-2 can be spread via person to person transmission of respiratory droplets regardless of whether an individual has displayed symptoms of the disease.[4] Therefore, public health interventions are essential for slowing the spread of COVID-19. In China, the government

implemented a nationwide quarantine. Many other countries have since followed suit, including India, France, Italy, New Zealand, Poland, and the UK.[5]

However, the US has not had a consistent, nation-wide response. Recently, the federal government has recommended individuals work from home and avoid unnecessary outings until April 30 in order to slow the spread of COVID-19.[6] It has been the responsibility of the states to issue stay-at-home orders, also known as shelter-in-place orders, which require individuals other than essential workers to stay home. Forty-two states have issued statewide stay-at-home orders to date; 8 have not (North Dakota, South Dakota, Iowa, Nebraska, Wyoming, Utah, Oklahoma, and Arkansas).[7]

DIRECT EFFECTS OF STAY-AT-HOME ON THE HEALTH BURDEN OF COVID-19

Epidemiologic Evidence

Learning from other countries: Stay-at-home orders play a crucial role in slowing the spread of human viruses.[8] Many countries that have adopted stay-at-home orders during the current pandemic have seen a dramatic decrease in the rate of SARS-CoV-2 infection.[9–12]

In China, the COVID-19 outbreak coincided with one of the country's busiest travel periods, Lunar New Year.[13] To prevent rapid dissemination of disease from the epicenter in Wuhan, China enacted a travel ban and closed schools, government offices, libraries, museums and factories on January 23. Law enforcement ensured that citizens complied with stay-at-home orders, and door-to-door temperature monitoring directed those with fevers to quarantine centers. While labeled as "draconian" by international media sources,[14] China's stay-at-home measures effectively reduced the spread of COVID-19. All Chinese provinces outside of Hubei experienced faster disease growth rates before the lockdown, and the disease burden in these regions was almost entirely predicted by human travel from Wuhan. After implementation of travel bans and stay-at-home interventions, disease growth rates became negative across provinces,[10,15] indicating the efficacy of these measures in mitigating disease transmission. Projections based on rates of spread prior to the lockdown indicate that China's interventions prevented approximately 94.5% of COVID-19 cases that would have occurred if transmission had continued unabated.[12] China's stay-at-home measures effectively prevented exponential growth in the number of COVID-19 cases,[16] delaying both national and international spread of the disease.

The dramatic impact of non-pharmaceutical interventions (NPIs) such as stay-at-home orders also replicates outside of mainland China. In late January, Hong Kong implemented substantial physical distancing measures such as closing schools and encouraging flexible working arrangements. Soon after, the estimated rate of community virus transmission declined by approximately 44%.[17] Similarly, a study that analyzed the impact of NPIs on eleven European countries found that weeks after the interventions were implemented, the average estimated effective reproduction number (the number of cases directly generated by one case) across the eleven European countries dropped from close to 4 before the interventions to around 1.43 afterwards, a 64% reduction.[18]

NPIs and children: While there are many forms of NPIs, stay-at-home orders are particularly effective in limiting disease transmission through children. This is because children, in general, have a harder time following ideal hygiene protocol and have frequent social contact.[19] It is

especially important to reduce transmission through children during the current pandemic because children are often asymptomatic and may play a major role in the spread of the virus.[20–23]

Learning from prior pandemics and epidemics: History has demonstrated that stay-at-home orders are effective at slowing the rate of human viral infection and decreasing the burden on healthcare services. During the 1918-1919 Influenza Pandemic, cities that rapidly implemented NPIs such as physical distancing significantly reduced transmission rates.[24–27] In the US, cities that implemented NPIs early, such as St. Louis and San Francisco, experienced lower mortality rates.[28] The same effect was also seen during the SARS outbreak of 2003, where places such as Taiwan and Hong Kong that implemented stay-at-home orders were better able to attenuate the spread.[29,30] In addition, unintentional stay-at-home interventions such as snowstorms and strike-related school closures have also proven helpful to slowing the spread of many respiratory viruses, such as seasonal influenza, respiratory syncytial virus and human coronaviruses.[31–33]

The role of silent spreaders: In past pandemics, there has been evidence for the efficacy of only isolating those that are diagnosed or who have had known contact with those diagnosed.[34,35] After exposure, people may become infectious anywhere in the 2-14 day standard SARS-CoV-2 incubation period before symptom onset.[36] Typically, individuals are infectious 1-3 days prior to the onset of symptoms,[37] and between one-third and one-half of individuals never develop symptoms.[38,39] Mildly symptomatic or completely asymptomatic carriers have already contributed to the rapid global spread of SARS-CoV-2.[4,40,41] Due to limited testing capacity in the US, testing is currently biased toward people with more severe illness. Many symptomatic Americans will likely go undiagnosed if they had no known exposure to a diagnosed individual, are not a healthcare or public safety worker, do not have lower respiratory tract symptoms, or do not have adequate access to the appropriate healthcare facilities.[40,42,43] Therefore, community stay-at-home orders are especially important in America, where there is a large pool of undiagnosed carriers.

Modeling Evidence

Preventing health system overload: Hospitals and healthcare systems must be able to take care of ill COVID-19 and non-COVID-19 patients with limited healthcare resources. The potential for COVID-19 to overwhelm healthcare systems has been borne out in Italy, where healthcare workers report that they must work "well below our normal standard of care," rationing resources based on patient health and suspending regular health services, including vaccination.[44]

Approximately three months after the outbreak of SARS-CoV-2 in China, the United States is preparing for stress on healthcare systems and revisiting triage plans for prioritizing which patients will receive care in the face of limited resources.[45] Washington State reported the first confirmed COVID-19 case in the United States. At the end of February, the state had only 4 confirmed cases. This number reached 150 by the end of the first week of March and more than 700 by the end of the second week, demonstrating the explosive exponential growth at early stages of an epidemic.[46] This rapid growth was also reflected in the statewide percent of new emergency inpatient hospitalizations with COVID-19 symptoms, which increased fivefold from 0.09% on February 23th to 4.6% on March 15.[46] In addition, many patients continue to occupy hospital beds even after completion of necessary hospital care due to difficulty placing these patients in community facilities, further limiting hospital capacity.[47]

By mid-March, New York became the epicenter of COVID-19 cases in the United States. After 1,000 new cases emerged overnight, Governor Andrew Cuomo asked that 50% of nonessential business employees work from home.[48] Two days later, the state's cases tallied more than 8,300, and New York City alone accounted for one-third of COVID-19 cases across the country. At this rate, the state projected that New York would need up to 37,000 intensive care unit (ICU) beds (more than 12 times current capacity) in 45 days.[49] Governor Cuomo reacted with full shelter-in-place orders; the work mandate extended to 100% of nonessential businesses and strict physical distancing took effect. Specialist physicians were drafted to emergency and ICU services, healthcare workers came out of retirement, and NYU School of Medicine allowed senior students to graduate early to assist the overwhelmed New York hospital system.[50,51] On April 10, New York reported its first decrease in the number of COVID-19 patients being treated in ICUs since the outbreak began. Governor Cuomo credited the slowing of disease to the state's aggressive stay-at-home measures and New Yorkers' compliance.[52] However, as of this date, there were still over 180,000 confirmed COVID-19 cases and over 8,600 deaths in the state of New York.[48] This reflects the urgency of action due to lags between non-pharmaceutical intervention and their effects on hospitalizations and deaths. Hospitalizations due to COVID-19 occur approximately ten days following infection, while deaths occur, on average, three weeks after exposure.[53,54]

Based on epidemiological modeling, a stay-at-home order may help to keep hospitalized cases within capacity by reducing and delaying peak demand. Researchers at Harvard determined that strict physical distancing (i.e., stay-at-home) compared to moderate physical distancing (i.e., limits on large gatherings) could slow the spread of the epidemic to eighteen months from six months and reduce infection rates from 60% to 20% nationally.[55] In the former scenario, demand could potentially be met (95% of US hospital beds filled), whereas the latter would require over seven times the number of available hospital beds nationally. The type of strong physical distancing promoted by a stay-at-home order can delay the peak of the epidemic by several months,[53] allowing hospitals to prepare resources like hospital beds and ventilators and researchers to potentially develop more effective treatments. Under a scenario where non-pharmaceutical interventions in Great Britain were adaptively triggered "on" when ICU cases exceeded 3,000 in one week, isolation of symptomatic cases reduced peak bed demand by about one-third. In this same setting, case isolation combined by population-wide physical distancing reduced peak bed demand by 68-75% depending on R0, suggesting that population-wide measures are more effective in reducing demand beyond hospital capacity.[53]

Less disruptive control measures: Less disruptive long-term control measures may become feasible over time depending on serological and diagnostic testing availability. Mass testing combined with rigorous contact tracing would allow public health officials to contact people who have been exposed and facilitate their entering isolation, potentially removing pre-symptomatic and asymptomatic individuals from the population.[56] "Shield immunity" may be established by recovered individuals entering into essential roles to reduce contact between infectious and susceptible individuals.[57] In this manner, transmission is reduced through targeted strategies, potentially allowing physical distancing in the general population to be relaxed. There is likely a threshold for the number of tests that must be conducted (as a proportion of prior or current infections) in order for these interventions to be effective.[58] Reducing weekly cases through stay-at-home measures may allow us to shift to another strategy more effectively and sooner.

INDIRECT EFFECTS OF STAY-AT-HOME

Economic Effects

It is difficult to understate the economic impact of the COVID-19 pandemic. During the last two weeks of March and the first week of April, more than 16 million people filed initial claims for unemployment benefits,[59] and that number is growing. The pandemic is a large shock to both aggregate supply —as people become sick and are unable to work, economic output will fall— and aggregate demand —as people worried about becoming infected are less willing to engage in normal economic activity like going to stores and restaurants. Stay-at-home measures temporarily add to that economic pain by shutting down large portions of the economy. But the most important factor in the long-term health of the economy is the health of the population. Coordinated, well-enforced stay-at-home orders can reduce the duration and severity of medical and economic pain. If paired with government support for households and businesses, stay-at-home orders will allow for a faster, more robust economic recovery —as demonstrated by epidemiological models, historical research on previous pandemics, and macroeconomic models. In the near term, stay-at-home orders are necessary. Less restrictive public health measures, such as targeted quarantines and intense test-and-tracing, would be less economically costly. However, until capacity for testing and monitoring is substantially expanded, they remain infeasible.

Current economic situation and arguments against stay-at-home: The COVID-19 pandemic and associated responses have already had a substantial impact on the economy. Unemployment claims have spiked, and experts from Goldman Sachs project a 24% decrease in annualized GDP in the second quarter of 2020.[60] As uncertainty looms and people lose their jobs, they will reduce their spending, and may risk housing and food insecurity. Businesses run the risk of closing permanently if they cannot pay their bills. These impacts will be disproportionately felt by service and manufacturing businesses,[60] their employees, and those who were already economically vulnerable.[61]

On the surface, stay-at-home orders may appear to exacerbate these effects by further restricting economic activity. Some pundits, journalists, and politicians have raised the prospect that aggressive public health measures may cause more harm than benefit, suggesting that such measures should be lifted relatively soon.[62]

While there are trade-offs to consider, economists in both business and academia agree that an effective public health response is a prerequisite to economic recovery. In fact, aggressive public health measures are likely to help the economy in the medium- to long-run. The consulting firm McKinsey, along with the economic forecasting firm Oxford Economics, modeled nine scenarios based on the degree of viral containment and the strength of the economic policy response. Assuming a partially effective policy response, aggressive viral containment would result in the US economy returning to pre-pandemic levels by the fourth quarter of this year. Under the same economic policy response but only a moderately effective viral containment (that allows the virus to recur), the economy would not recover until early 2023.[63]

A survey of distinguished academic economists demonstrates that this conclusion is not controversial. In the survey, fielded by the University of Chicago Booth School of Business, not a single respondent disagreed with the statement that "abandoning severe lockdowns at a time

when the likelihood of a resurgence in infections remains high will lead to greater total economic damage than sustaining the lockdowns to eliminate the resurgence risk". [64,65]

Review of economic evidence: There are three sources of evidence for the claim that an analysis of the benefits of stay-at-home policies outweigh their economic cost.

Value of lives to the economy. A straightforward way to calculate the economic benefit of physical distancing measures combines epidemiological forecasts with standard tools in cost-benefit analysis. Greenstone and Nigam[66] estimate the number of deaths that could be averted through physical distancing policies over the next six months. They use the Imperial College model [53] to compare a physical distancing policy —specifically, isolation of suspected cases (and those in their households) and physical distancing for high-risk people— to a "no-intervention" scenario. They then calculate the monetary value of the policy by multiplying the number of lives saved (by age group) by the age-adjusted value of a statistical life —a standard concept used by the U.S. Federal Government in cost-benefit analysis.[67,68] This calculation suggests that the mortality benefit of physical distancing measures have an economic value of about $8 trillion, or around $60,000 per household —equivalent to one-third of the U.S. GDP. Even under more modest projections about the course of the disease and lower assumptions about the value of a statistical life, physical distancing is valued at over $3 trillion. These estimates can be viewed as a lower bound of the benefit of stay-at-home orders as they are based on physical distancing measures that are less effective in reducing mortality than blanket stay-at-home orders. Similar approaches by other researchers suggest benefits of physical distancing in the range of $5 trillion.[69] This straightforward calculation implies that the costs to physical distancing would have to be massive to outweigh the economic benefits.

Historical experience shows the value of early intervention. Research on previous pandemics shows us that they are extremely economically costly if left unmitigated, but that public health interventions offset the economic damage. States that were hit harder by the 1918-1919 Influenza Pandemic saw substantially lower activity over the subsequent five years. A state-level increase of roughly 150 excess influenza/pneumonia deaths per 100,000 people in 1918 was associated with an 8% decline in manufacturing employment, a 6% decline in manufacturing output, and substantial decreases in bank assets and spending on durable consumer goods such as automobiles.[70] However, cities that put more intense non-pharmaceutical interventions in place (measured by the speed and length of implementation) performed much better economically than cities that deployed less-intense NPI measures. In short, U.S. experience with the 1918 pandemic suggests that there is not a trade-off between public health interventions and economic growth in the medium run; if anything, aggressive NPIs lead to higher economic output. Studies from both the U.S. and other countries document substantial economic costs to pandemics.[71–74] Some of the economic effects of the 1918 influenza lasted for decades: cohorts exposed to the 1918-1919 Influenza Pandemic in utero had worse educational, health, and economic outcomes later in life.[75] Taken together, this research suggests that an unmitigated COVID-19 pandemic would be economically disastrous in the short-, medium-, and long-term.

Macroeconomic models and optimal policies. Research that integrates macroeconomic models with disease transmission models from epidemiology helps to quantify the trade-offs involved. A key insight from this research is that there are feedback loops between public health and the

economy.[76,77] Absent government intervention, individuals do not fully internalize the social cost of their economic activity; namely, by working, going to stores, and so on, they risk spreading the disease and harming others. Therefore, the socially optimal level of economic activity is much lower than what would obtain under a laissez-faire approach to the pandemic. Governments should put policies like stay-at-home orders in place to enforce this lower level of economic activity. While they are economically costly in the short term, they reduce mortality enough to outweigh the short-term economic pain[78] and allow for a more robust economic recovery in the long-run.

Eichenbaum et al.[76] find that the optimal mitigation policy in their model entails immediate implementation of a high level of economic shutdown. The severity of the restrictions should then be ramped up over time as the disease spreads. The cost to delay is very large: if policymakers were to wait until the pandemic gets out of control to implement containment measures, there will be many more deaths and a much deeper recession. Similarly, reopening the economy too early — while a large portion of the population is still susceptible to COVID-19— is also economically costly.[76] Lifting restrictions leads to a temporary improvement in the economy, but it also causes the infection rate to increase. As a result, mortality would increase substantially and the economy would enter a second, persistent recession. Thus, there are no long-run economic benefits to reopening the economy early. These conclusions are consistent with evidence about the importance of timely and persistent interventions during the 1918 Influenza Pandemic.[24,25]

Economic policy response: The balance of the economic evidence tilts in favor of aggressive public health measures. Nonetheless, more targeted policies that allow people who are known to be healthy and/or immune return to work would substantially lessen the costs.[76,79,80] However, such targeted measures require expanded testing capacity and are likely infeasible currently. Therefore, during the most intense phases of physical distancing, we need to invest in expanded testing capacity, increase the capacity of the health care system, and design systems that allow people who cannot spread the disease to return to work. Until more testing is available, blunter measures like blanket stay-at-home orders are the best policy response.

Physical distancing should also be paired with economic stabilization and relief spending, to insure people and businesses who are suffering financially from stay-at-home orders. Social insurance programs such as unemployment insurance, direct cash assistance (as in the CARES Act), and food assistance will be crucial to help people stay afloat and avert a long-term recession.[81] Aid to businesses is also important in positioning the economy for a strong recovery once the most intense phases of physical distancing are lifted —especially programs that prevent businesses from permanently closing during the downturn and those that allow businesses to keep workers on the payroll, thereby averting permanent mass layoffs.[81–83]

Mental Health Effects

People staying-at-home during a pandemic face enormous mental health issues related to isolation, financial insecurity, stress from school closures, and abrupt disruption of everyday routines. The mental health burden of stay-at-home directives cannot be underemphasized. However, this impact must be weighed against the psychological stress that patients, families, and healthcare workers face during an acute spike in disease burden due to lack of effective disease intervention. In

addition to reducing disease burden through public health interventions, officials and mental health providers can mitigate the uncertainty and distress associated with staying-at-home.

Mental health impact of stay-at-home directives: While stay-at-home measures can effectively slow transmission of infectious disease, this positive public health impact may come at the cost of indirect societal consequences. For instance, social isolation is strongly associated with anxiety, depression, and suicidal ideation.[84] During the SARS epidemic, more than 15,000 people with suspected exposure to the virus were instructed to remain under voluntary quarantine in Toronto. A cross-sectional study of this population revealed that 30% of quarantined individuals had post-traumatic stress disorder (PTSD) indices similar to those reported by journalists working in war zones. Additionally, PTSD and depression symptoms were exacerbated by a decrease in household income,[85] which may be an important consideration for those who are displaced from the workforce during stay-at-home orders. These data also indicate that psychological stress disproportionately impacts low-income families, and fear of losing jobs has been associated with employees exacerbating disease outbreaks by attending work while ill.[86,87] Reports from China, the first country to enforce widespread lockdown measures in the current pandemic, indicate that children are also particularly vulnerable to the psychological impact of home confinement. Disruption of normal school, recreational, and social structures during a period of critical neurodevelopment and socialization may cause acute distress and negatively impact long-term health.[88,89]

Mental health impact on patients, families and healthcare workers: Although social isolation may negatively impact mental health, the ramifications of stay-at-home orders must be considered in the context of the psychosocial stressors associated with an acute spike in COVID-19 disease burden. As discussed earlier, epidemiological studies demonstrate that physical distancing is effective at slowing the spread of infectious disease, and predictive modeling indicates that the US healthcare system will be overwhelmed if we do not mitigate the rate of SARS-CoV-2 transmission. This scenario has dire mental health consequences for both the general population and the healthcare providers treating COVID-19 patients. Two cross-sectional studies on the mental health of medical and nursing staff in Wuhan during the COVID-19 outbreak found that over 60% of healthcare providers suffered mild to severe psychological disturbances, including anxiety, insomnia, and depression.[90,91] The stress of caring for patients may be amplified by the current nationwide shortage of ventilators and personal protective equipment for US healthcare workers.[92] In the US epicenter of New York City, physicians have described overwhelmed hospitals as *apocalyptic*[93] and *like a war zone*[94]. This strain on the healthcare system and the infectious nature of the disease have led to a no-visitor policy in COVID-19 wards; family members cannot be at the bedside of a loved one who passes away. Sudden death of a loved one and lack of closure are two risk-factors for complicated grief, a form of bereavement complicated by adjustment disorder that interferes with normal function.[95]

Increasing public fear: Acute morbidity and mortality may also trigger public fear. Exacerbated by uncertainty and poor communication from public officials, public fear can manifest as discrimination, stigmatization, and scapegoating of vulnerable populations, authority figures, and scientists.[96] Specifically, anti-Chinese sentiment stemming from the first reported outbreak in Wuhan has fostered psychological, physical, and economic hardship for people of Asian descent, regardless of their country of origin.[97,98]

Mitigating the psychological stress of stay-at-home: There are serious mental health consequences for both stay-at-home directives and the spike in disease burden that would result from not enacting isolation orders. However, psychiatric services and public health initiatives can reduce the mental health burden of stay-at-home.[99,100] Virtual platforms may alleviate feelings of isolation (via social engagement), permit economic productivity (via online work spaces), and increase access to psychological services (via telehealth). Additionally, homeschooling and online courses can mitigate disruption for children and adolescents.[89] Finally, reliable messaging from public officials and availability of protective measures (hand hygiene and mask wearing) can reduce stress, anxiety and depression in physically isolated populations.[101]

Political Effects

Elected officials may be wary of taking dramatic steps to intervene in the pandemic for fear of an economic downturn hurting them electorally. In addition to the above research suggesting that tradeoffs between public health and economic performance are likely to be limited, several factors relating to the current situation suggest that voters will not blindly punish politicians for economic downturns. Most importantly, unexpected events like COVID-19 present an opportunity for politicians to demonstrate their leadership and competence to the public. Political science research on natural disasters and on the effect of the economy on elections suggest that voters are likely to reward politicians who mount an effective response to the pandemic.

Evidence from natural disasters. Research on natural disasters suggests that strong responses generate increased vote shares for incumbent politicians. One study finds that counties receiving more disaster relief spending vote for the incumbent president's party at a significantly higher rate: in presidential elections between 1988 and 2004, an increase in disaster relief spending from $1 per person to $10 per person causes an 0.77 percentage point increase in the president's party's vote share.[102] At the state level, governors who request emergency assistance from the federal government in the wake of natural disasters receive a 4 percentage point increase in vote share relative to governors who do not request assistance.[103] In part, these patterns can be explained by the fact that natural disasters —similar to the current pandemic— present an opportunity for voters to learn about the leadership capability of politicians.[104]

The economy and elections. Research on the effect of the economy on voting suggests that the electorate is not completely naïve in assigning reward and blame to incumbent politicians.[105,106] Instead, research suggests that voters punish incumbents for poor economic conditions only when they are in the control of policymakers. For example, governors' electoral fortunes are correlated with economic conditions only in states that are not reliant on natural resources or agriculture, where global commodities prices and weather determine the state of the economy.[107] Cross-nationally, voters punish governments for poor economic performance only in countries that experience economic downturns beyond those that are experienced in other countries.[108] These studies suggest that even in the face of a recession, voters are attentive to the actions of the incumbent government.

Because lax public health responses will increase the death toll from COVID-19 and will likely worsen the coming recession, governors who fail to take effective action —either through delaying

action or prematurely suspending stay-at-home policies— may fare worse when they come up for re-election.

IMPLEMENTATION OF STAY-AT-HOME

Legal Context

States have primary authority for instituting stay-at-home orders. However, through mechanisms like Centers for Disease Control (CDC) guidelines and official White House statements, the federal government can still act as a coordinator to ensure a consistent, synchronous response. And as measures taken in many other democratic countries demonstrate, governments can implement stay-at-home orders across a wide array of democratic settings.

In the United States, state governments are uniquely positioned to safeguard public health. This power stems from the federalist structure of the U.S. government, which delegates —by design— extensive public health authority to states. To guard against tyranny, the framers of the U.S. Constitution created a federal government with limited powers, and divided powers between the federal government and the states to ensure that no single government entity could become too powerful. States exercise broad power over domains not expressly designated to the federal government by the Constitution. And although the federal government enjoys supreme power over states, it can exercise that power only in the limited circumstances specified by the Constitution. Thus, states retain "police powers," derived from the Tenth Amendment to the Constitution: the inherent authority to enact regulations to protect public health, safety, and morals. What results is a system in which states have primary responsibility for public health matters within their borders and may delegate authority to local governments.[i]

In this structure, though both states and the federal government have quarantine powers, the specific power to order residents to stay at home belongs to the states. Under the Commerce Clause of the U.S. Constitution, the federal government has the authority to regulate activities that substantially affect interstate commerce.[ii] This power and the national security power undergird the Public Health Services Act, through which the federal government can administer interstate and foreign quarantine regulations.[iii] But stay-at-home orders, by compelling residents to restrict their movements *within* the state or locality, relate more closely to intrastate activities. As one recent and illuminating exchange between Gunninson County, Colorado and the state of Texas demonstrates, local governments have authority to restrict movement into and out of localities, even when those restrictions may impact the citizens of another state.[iv]

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[i] The seminal case on state public health authority, *Jacobson v. Massachusetts,* 197 U.S. 11, 25 (1905), allows states to delegate public health authority to localities ("the state may invest local bodies called into existence for purposes of local administration with authority in some appropriate way to safeguard the public health and the public safety.").

[ii] *See* U.S. Const. art. I, § 8, cl. 3; *see also Wickard v. Filburn*, 317 U.S. 111 (1942).

[iii] *See* 42 U.S.C. § 264.

[iv] *See* Letter from the Gunninson County, Colorado County Counsel's Office to the Texas Attorney General (Apr. 10, 2020), https://covid19.gunnisoncounty.org/wp-content/uploads/2020/04/4-10-2020TXAGGunnCoAtty.pdf.

Because the Constitution does not specify federal power to regulate intrastate activities, states enjoy broad power to regulate public health within their borders. Employing their "police powers," states can pass regulations and laws to protect their residents' health, subject to constitutional protections such as freedom of speech, equal protection, and due process.[v] And so, a measure "enacted to protect public health . . . 'will not be struck down unless it has no real or substantial relation to [that goal], or is, beyond all question, a plain, palpable invasion of rights' secured by the Constitution."[vi]

While the federal government cannot itself take over the implementation of stay-at-home orders, it can nevertheless facilitate their coordinated adoption, as the German government has.[vii] Through CDC guidance and White House statements, the federal government has the ability to formally urge state health officers and governors to implement stay-at-home measures and close schools as well as non-essential businesses. In addition, the U.S. federalist structure leaves the federal government with substantial other powers to act in the face of a pandemic, as pandemics implicate interstate commerce, national security, and immigration—areas over which the Constitution gives the national government authority. For example, the President can invoke the Defense Production Act to compel private companies to manufacture ventilators.[viii] Similarly, the Department of Health and Human Services declared a public health emergency to allow reassignment of state, tribal, and local health personnel to address COVID, among other things.[ix] And Congress can use its spending powers to incentivize state action, or its commerce powers to restrict interstate business operations.[x]

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[v] In *Jacobson*, 197 U.S. 11 (1905), the Supreme Court held that states and localities enjoy broad power to mandate vaccination against smallpox. Furthermore, under the Religious Land Use and Institutionalized Persons Act (RLUIPA) and the First Amendment, states may substantially burden religious freedom when those actions are the "least restrictive means of furthering [a] compelling state interest." 42 U.S.C.S. §2000cc (2000); *see also Burwell v. Hobby Lobby Stores, Inc.*, 573 U.S. 682 (2014) (summarizing the history and applicability of RLUIPA). Where a state acts to limit physical gatherings in the face of a global pandemic—and does so in a neutral, generally applicable manner—it acts within its broad police powers to further a compelling state interest. *See also Prince v. Massachusetts,* 321 U.S. 158, 166-67 (1944) ("The right to practice religion freely does not include liberty to expose the community . . . to communicable disease.")

[vi] *Hickox v. Christie*, 205 F. Supp. 3d 579, 591 (D.N.J. 2016) (quoting *Jacobson*, 197 U.S. 11, 25 (1905)). But, as the court noted in *Jacobson*, "the rights of the individual in respect of his liberty may at times, under the pressure of great dangers, be subjected to such restraint, to be enforced by reasonable regulations, as the safety of the general public may demand." 197 U.S. at 29. *See also U. S. ex rel. Siegel v. Shinnick,* 219 F. Supp. 789, 791 (E.D.N.Y. 1963) (upholding quarantine of a woman who had potentially been exposed to smallpox, finding that a reliable showing of error was needed to override public health experts' judgment, and noting that public health experts "were not free and certainly not bound to ignore the facts that opportunity for exposure existed").

[vii] Federal Government Press and Information Office (BPA) of Germany, *Chancellor Merkel's Meeting with the Heads of State on the Coronavirus*, Press Release 104 (Mar. 22, 2020), https://bit.ly/2JOqge5.

[viii] Congressional Research Service, The Defense Production Act of 1950: History, Authorities, and Considerations for Congress 4-9 (Mar. 2, 2020), https://fas.org/sgp/crs/natsec/R43767.pdf.

[ix] *Secretary Azar Declares Public Health Emergency for United States for 2019 Novel Coronavirus*, HHS (Jan. 31, 2020), https://www.hhs.gov/about/news/2020/01/31/secretary-azar-declares-public-health-emergency-us-2019-novel-coronavirus.html.

[x] *See* Rebecca L. Haffajee & Michelle M. Mello, *Thinking Globally, Acting Locally — The U.S. Response to Covid-19*, New England J. Med. 1-3 (2020), https://www.nejm.org/doi/full/10.1056/NEJMp2006740.

Nationally coordinated stay-at-home measures have been implemented in many other democratic countries, illustrating that a robust, nationally-coordinated response to a pandemic is entirely possible in a democratic setting.[xi] Importantly, despite a legal system that—like the U.S. system—allocates broad authority to states, Germany instituted a coordinated national order on March 22, 2020 that banned gatherings of more than two people, closed non-essential businesses, and discouraged contact with individuals outside residents' households.[xii] This order resulted from agreement between Germany's federal and state governments.[xiii] The United Kingdom also recently ordered residents to stay at home, allowing residents to leave only to shop for basic necessities, exercise once daily, seek medical attention, and travel for work in certain circumstances.[xiv] And Taiwan implemented a robust quarantine strategy for exposed individuals entering the country, backed by technological innovations to ensure compliance.[xv]

Governments must, of course, proceed with caution and concern for those populations that stay at home orders may leave particularly vulnerable, including homeless populations and individuals at risk of domestic violence. But by working with legal advocates, civil society, and sister jurisdictions, governments can exercise police power efficiently, thoughtfully, and reasonably, as many states already have.[xvi] Moreover, members of the legal academic community have already begun to help answer the legal and policy questions that exercising police power in these unique circumstances will entail.[xvii]

[xi] *See* Audrey Wilson, *The Countries That Are Succeeding at Flattening the Curve*, Foreign Pol. (Apr. 2, 2020, 12:09 PM), https://foreignpolicy.com/2020/04/02/countries-succeeding-flattening-curve-coronavirus-testing-quarantine/.

[xii] Federal Government Press and Information Office (BPA) of Germany, *Chancellor Merkel's Meeting with the Heads of State on the Coronavirus*, Press Release 104 (Mar. 22, 2020), https://bit.ly/2JOqge5.

[xiii] *Id.*

[xiv] Cabinet Office, Government of the United Kingdom, New Rules On Staying At Home And Away From Others (Mar. 23, 2020), https://bit.ly/3aS9qac; *see also* Cabinet Office, Government of the United Kingdom, *Full Guidance on Staying At Home and Away From Others* (Mar. 29, 2020), https://bit.ly/2UU5BeW.

[xv] C. Jason Wang, Chun Y. Ng, Robert H. Brook, *Response to COVID-19 in Taiwan: Big Data Analytics, New Technology, and Proactive Testing*, JAMA (2020), https://bit.ly/2V7HA2Y; *see also id.,* Supplementary Online Content, https://bit.ly/3c5FQOK.

[xvi] As of April 7, 2020, "at least 316 million people in at least 42 states, three counties, nine cities, the District of Columbia and Puerto Rico are being urged to stay home." Sarah Mervosh, Denise Lu & Vanessa Swales, *See Which States and Cities Have Told Residents to Stay at Home*, New York Times (Apr. 7, 2020), https://www.nytimes.com/interactive/2020/us/coronavirus-stay-at-home-order.html?auth=login-email&login=email. The core elements of these orders have varied across states. *See* James C. Hodge, *COVID-19 Emergency Legal Preparedness Primer* (Apr. 8, 2020), The Network for Public Health Law, https://www.networkforphl.org/wp-content/uploads/2020/04/Western-Region-Primer-COVID-4-8-2020.pdf, slides 30-31 (describing the variety of stay at home orders implemented in different states).

[xvii] *See, e.g.,* Hodge, *COVID-19 Emergency Legal Preparedness Primer* (Apr. 8, 2020), The Network for Public Health Law, https://www.networkforphl.org/wp-content/uploads/2020/04/Western-Region-Primer-COVID-4-8-2020.pdf (outlining constitutional impediments and best legal practices for these orders).

Factors for Implementation

In developing a stay-at-home strategy, everyone has a role and responsibility to ensure successful implementation, starting with governments and moving down to employers and individuals.

At a basic level, trust in the governmental body is linked to people's willingness to follow stay-at-home orders quickly and feel a sense of purpose in doing so. In Germany, in addition to healthcare system mobilization and preparedness, many see Chancellor Angela Merkel's leadership as one reason for the low fatality rate. Chancellor Merkel, a trained scientist, has regularly communicated in a calm and clear manner as the crisis has progressed, while imposing increasingly strict social distancing measures. These restrictions have been met with minimal political opposition and are broadly followed by the populace.[109]

Governments should create clear and accessible messages in different formats, including social media, that advise the public on necessary actions and educate them on what they can and cannot do.[110] This is crucial for reducing the sense of unease and confusion civilians feel when encountering the phrase "shelter-in-place." The San Francisco Department of Public Health issued clear directives on stay-at-home that delineated essential activities that people can partake in including: taking care of your own wellbeing (go pick up that medicine); obtaining supplies or delivering supplies to others (go grocery shopping if you need to); working out, as long as you stay 6 feet away from everyone else; taking care of your animals (take your dog for a walk); or going to work at an essential business, such as medical professionals.[111] Offering specific, yet limited, ways to leave the home can reduce the sense of isolation, while maintaining health precautions to spread the virus. There is currently no unified message across the United States; each state has handled messaging and defining their stay-at-home directives in different ways.

Government and health authorities should also provide accurate health information regarding the epidemic to quell the spread of rumors.[112] A study showed that higher satisfaction with health information received was associated with a lower psychological impact on the outbreak and lower levels of stress, anxiety, and depression. Additional information on medicines or vaccines, routes of transmission, and updates on the number of infected cases and location through real-time, online tracking map were also associated with lower levels of anxiety.[101]

Governments should offer basic resources to help alleviate issues facing its constituents. The state of California created a website aggregating resources regarding meal delivery, food banks, calls for donations and volunteers, wellness checks with online neighborhood communities and hygiene kit drop offs.[113] Mobilizing the community to act together and get involved creates a sense of unity and collective motivation to endure the difficulty of isolation.

Governments should also brainstorm creative solutions that go beyond typical policies to alleviate the harmful effects of stay-at-home protocols on the most vulnerable populations. The San Francisco Municipal Transportation Agency recently announced that it would suspend enforcement on certain regulations, including towing cars parked for more than 72 hours, peak hour tow-away, and other towing not related to safety or access.[114] For homeless people that live in their cars, vehicles provide the physical distancing needed to stay healthy and safe. Governor Gavin Newsom secured approval from the Federal Emergency Management Agency (FEMA) to

provide safe isolation capacity for thousands of homeless people in California, which became the first state to do so. This initiative set an initial goal of securing up to 15,000 rooms, and has already moved over 1,000 people.[115]

Employers also have an important role in facilitating stay-at-home protocol. They are incentivized to provide opportunities to work from home to maintain their business and the economy, while allowing individuals to sustain an income and provide for their families. At both the federal and state level, laws are being enacted to require employers to provide sick leave. President Trump recently signed the Families First Coronavirus Response Act, which will provide paid sick leave to certain employees to deal with coronavirus-related reasons.[116] At the state level, currently at least 12 states already require employers to provide paid sick leave to employees.[117] In Minnesota, there is even pending legislation that would require employers to allow qualified employees to work from home, as long as it is reasonable and won't impose an undue hardship on the employer.[118]

Lastly, the media plays a critical role in reducing confusion and isolation by sharing people's stories, explaining stay-at-home orders, and offering solutions to maintaining meaningful interactions from home.[119]

CONCLUSIONS

Both historical and contemporary examples evidence the efficacy of stay-at-home orders as a tool in curbing the spread of novel pandemics like COVID-19. This review indicates that the timing and degree of collective commitment to stay-at-home orders dramatically impact their efficacy in limiting the spread of viruses such as SARS-CoV-2. At a time when the U.S. continues to struggle to make widespread diagnostic testing available and equip hospitals to respond to a surge in severely ill patients, implementing stay-at-home orders consistently across the country is more critical than ever —both to save lives and prevent irreversible, long-term damage to the U.S. economy.

Epidemiological modeling suggests that stay-at-home interventions reduce deaths by keeping hospitalized cases within capacity by reducing and delaying peak demand on the health system. In addition to directly saving human lives, delaying peak demand will allow the U.S. to shift to a strategy of increased testing sooner. The positive impact of stay-at-home orders has and will continue to come at a cost to society—notably through adverse effects on mental health and depressed economic activity. However, for both of these concerns, the consequences of not implementing universal stay-at-home in the U.S. could be more devastating. The population-wide acute morbidity and mortality that would exacerbate in the weeks to come in the absence of unified stay-at-home policies could have negative implications for the mental health of both medical providers on the front lines and the general public. Furthermore, if this devastation increases in magnitude as predicted in epidemiological modeling that accounts for weak stay-at-home interventions, increases in public fear and uncertainty could drive more permanent damage to the economy.

Provided that state governments act swiftly and in unison, economic research suggests that aggressive public health measures are likely to help the economy in the medium- to long-run. In

examining previous pandemics, research indicates that an unmitigated COVID-19 pandemic would be economically disastrous, whereas public health interventions such as stay-at-home orders could offset the economic damage. While both epidemiological modeling and economic research indicate that stay-at-home orders should be enacted as soon as possible to minimize the loss of life and livelihood in the U.S. due to COVID-19, research from both fields also indicates the importance of policies that expand testing and increase surveillance in order to minimize the required duration of the most stringent stay-at-home orders. Importantly, swift action has to include support for the most vulnerable communities that suffer the most from the pandemic and side effects of imperative measures like stay-at-home orders.

The potential lifesaving and cost-saving benefit of the stay-at-home orders enacted by the majority of U.S. states is threatened by the inaction of a few. Political science research suggests that in addition to health and economic costs of inaction, there is a political cost for governors and other elected officials who fail to take timely action in situations of crisis that will likely outweigh the political cost of a slowed economy. Political leadership that has acted quickly and in line with the epidemiological and economic evidence in the current crisis have already been rewarded politically by their constituency. In addition to supporting expanded testing and surveillance, there are actions available to the federal and state-level governments that can alleviate the harmful effects of stay-at-home for the most vulnerable populations. Crucially, given the federalist structure of the U.S. Constitution, states are uniquely positioned to implement stay-at-home.

Lives will be lost, and the U.S. economy will pay for each day that the SARS-CoV-2 pandemic is permitted to spread further through gaps left by states that have not taken seriously the importance of stay-at-home orders in the collective response of the U.S. to the pandemic. This multidisciplinary review of the existing evidence strongly endorses urgent action by state governments that have not yet implemented stay-at-home protocols to do so immediately to protect public life and livelihood in this crisis. Stay home, America, and let our public health officials help us determine when to return to our lives and economy, safely.

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