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RESEARCH ARTICLE

U.S. COVID-19 Policy: Politics Trump Science

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ABSTRACT

In response to COVID-19, many industrialized nations have utilized intentional, consistent strategies with demonstrated efficacy for containment of the pandemic. However, United States COVID-19 policies have been inconsistent with virology and epidemiology data. As the politics surrounding the pandemic have become increasingly contentious, they have all but neutralized efforts to contain it. The lack of media attention to the high rate of long COVID (now estimated at 20%) and the growing list of long-term health consequences (with an increasing list of neurological complications) is also a significant factor contributing to the public's misunderstanding of the disease, and poor compliance with safety protocols. Consequently, COVID-19 remains uncontained in the US, which now has the dubious distinction of the highest number of COVID fatalities in the world. Recommendations are made for the intentional use in the US of consistent strategies with demonstrated efficacy for pandemic containment.

Introduction

COVID-19 was first identified in Wuhan, China in December of 2019. Initially labeled SARS-CoV-2 based on symptom presentation, the novel corona virus came to be more commonly known as COVID-19, referencing its date of identification. COVID-19 spread so rapidly that by the end of January 2020, the World Health Organization (WHO) had declared an international public health emergency and assigned COVID-19 pandemic status.^{1,2} Within a few months, at risk populations were identified.³⁻⁶ In early 2020, efforts were mounted in many countries to contain the growth of the contagion, including shelter in place policies leading to the closure of routine businesses including schools, restaurants, and outpatient healthcare facilities.⁷⁻¹¹

Over the ensuing two and a half years, safety protocols and policies intended to manage the spread of COVID-19 varied widely between different countries. While many industrialized nations have employed consistent policies leading to consistent reductions in COVID-19 new case and fatality rates, the US has employed inconsistent COVID-19 policies over time.^{12,13} US media continue to convey mixed messages to the public about COVID-19 and what behaviors are advisable.¹⁴ Perhaps more than anywhere else in the world, US COVID-19 policies have been influenced by politics.¹⁵ Consequently, among the industrialized nations, the US has one of the highest COVID-19 new case and fatality rates.¹⁶⁻¹⁸ How and why this situation has evolved requires exploration of COVID-19 containment strategies, their relative efficacy in specific countries, which strategy the US has employed, the consistency with which the US has pursued that strategy, and how US strategic COVID-19 containment efforts have been hampered or undermined by national, state and regional politics.

COVID-19 Politics and Policy: National pandemic strategies

Early in 2020, international concern rapidly increased about the COVID-19 outbreak in China. The World Health Organization (WHO) warned the governments of all nations on 23 January 2020 to prepare for COVID-19. The WHO encouraged containment strategies including “active surveillance, early detection, isolation and case management, contact tracing and prevention of onward spread.”¹⁹ Around the world, government

responses to the pandemic varied widely based on each country’s location, politics and history.

In a 2021 research study summarizing various COVID-19 containment efforts around the world, countries were organized into three distinct categories according to their strategy in response to the initial stages of the pandemic in 2020.²⁰ The strategic categories were defined as:

Aggressive containment: countries that tried to eliminate community transmission and achieved elimination status for 28 consecutive days by implementing public health interventions.

Suppression: countries that tried to suppress and minimize community infections by implementing public health interventions.

Mitigation: countries that tried to avoid overwhelming health systems by flattening the epidemic curve or achieving herd immunity in the population. Public health interventions focused on protecting vulnerable and high-risk groups while allowing transmission among low-risk groups.²⁰

Within each of these strategic categories, public health interventions were also separated into three distinct categories:

Population-based interventions: including lockdowns, face masks, social distancing, and personal hygiene.

Case-based interventions: including case detection, contact tracing of confirmed cases, isolation, and surveillance of cases.

Border control measures: including travel restrictions for travelers from high-risk countries or mandatory quarantine requirements.²⁰

Which of the three general strategies (aggressive containment, suppression and mitigation) was employed in each country was determined in large part by culture, values, history and politics. These variables affected the consistency with which each strategy was employed, which in turn determined health outcomes: new case and fatality rates within each country over time.²⁰ Discussion of the general strategies employed in various countries and the variables influencing consistency of policy enforcement is important for understanding the

course and outcomes of the COVID-19 pandemic to date.

Aggressive containment

The strategy of aggressive containment was predominant in Asian and Pacific countries including China, New Zealand, Singapore, Taiwan and the Republic of Korea (South Korea). Each of these countries employed case-based interventions with an emphasis on testing, tracking and isolating individuals with COVID-19. They also employed population-based interventions including strict lockdowns more stringent and longer than those implemented in countries pursuing other strategies. Venues and events involving gatherings were banned, and mobility restrictions were imposed, including limited access to public spaces except for essential business.

These countries also implemented strict travel restrictions closing their borders to most visitors. Travelers entering each country were required to be COVID tested and quarantined for 14 days. Workers at ports of entry were provided the means to conduct surveillance testing. For example, the health status of quarantined inbound travelers was monitored using smartphone-based technology. Each of these countries also engaged the community with comprehensive media campaigns using multiple platforms encouraging the public to adopt and maintain to prevention measures, and engaging community members to participate in the planning, promotion and delivery of prevention measures.

During the first two months of the COVID-19 pandemic, South Korea had the second highest number of cases worldwide. Subsequent case tracing indicated that hospital contacts and church attendance played a key role in the rapid spread of COVID-19.²¹ The South Korean government responded quickly to the pandemic, employing an aggressive containment strategy with an emphasis on case-based and population-based interventions that successfully contained COVID-19 new case and fatality rates.^{22,23} Drive- and walk-through diagnostic testing was made available on a widespread basis. Extensive contact tracing was employed. Technology was utilized to provide mobile applications from both government agencies and private developers that provided the public with information about the location of testing centers, trajectories of confirmed cases using digital maps, and similarly tracking the health status and

location of visiting travelers and others with high risk of exposure. South Korea's early intervention strategies demonstrate the effectiveness of quick adaptation of transportation infrastructure and location-based information technology in response to a public health crisis.²⁴⁻²⁶

Based on its close proximity and large volume of air travel to mainland China, Taiwan was expected in the early phase of the COVID-19 pandemic to have the second COVID-19 new case and fatality rates in the world. However, based on the severe acute respiratory syndrome (SARS) epidemic in 2003, Taiwan had adopted a stance of alert readiness for epidemics coming from China. Taiwan employed an aggressive containment strategy including rapid mobilization of case tracing, expanding the capacity of public health facilities, and using large data sets for big data analytics. Data from the national health insurance (NHI) database was integrated with immigration and customs database. This strategy made it possible to issue real-time alerts during a clinical visit based on travel history and clinical symptoms to aid case identification. Novel technologies including QR code scanning and online reporting of travel history and health symptoms were also utilized to classify travelers' infectious risks based on flight origin and travel history in the past 14 days. Text messages were used to notify travelers of their risk status. Low-risk travelers were sent a health declaration border pass directly to their smartphones, allowing rapid immigration clearance. People designated higher risk were quarantined at home, and their movements were tracked through their mobile phone to discourage breaking quarantine. The Taiwanese government also used NHI data to proactively test people considered at risk based on symptom presentation. A toll-free telephone number was created to provide the public with a hotline to report COVID-19-like symptoms in themselves or others. As the pandemic grew, major cities created their own hotlines to accommodate the massive volume of incoming calls. People in quarantine were provided food, moral support and frequent health checks. The outcome has been impressive containment of COVID-19 new case and fatality rates in Taiwan.²⁷

New Zealand was among the countries employing an early aggressive containment strategy in response to COVID-19. Border control, case tracing and lockdowns played key roles in bringing the COVID-19 new case rate to zero.^{25,26} However,

over the course of time, policies were liberalized, leading to the reintroduction of COVID-19 in New Zealand.²⁸ The success of aggressive containment in New Zealand led to increased public confidence and trust in the government.²⁹

The aggressive strategy employed in China, Singapore, New Zealand, Taiwan and South Korea reflects their governments' single-minded dedication to immediate, meaningful intervention. Public cooperation reflects trust in government and to some extent, relative homogeneity within each culture. Based on the 2003 SARS outbreak, China, Taiwan and Singapore had already increased preparedness for public health emergencies. The government in Singapore had created an infectious disease center for use in time of public health emergencies.³⁰ Significantly, heads of state in all five countries were receptive to input from scientific experts, enabling governments to design and implement national COVID-19 management policies based on scientific evidence. Widespread cultural acceptance of and belief in scientific method was an important ingredient in the acceptance of scientific input by heads of state. Within the first month of COVID-19 in Wuhan, China, a committee was assembled of experts in public health, infectious disease management and clinical treatment of infectious disease. This expert committee played a key role in determining COVID-19 response strategies and safety protocols.²⁰

China, Singapore, New Zealand, Taiwan and South Korea defined target numbers and achieved zero community cases in the first year of the pandemic. This is a remarkable accomplishment unparalleled in other parts of the world. By November 2021, China, New Zealand, Taiwan and South Korea were among the countries with the fewest cumulative deaths per million people. The strict policies were not received without criticism.³¹ Under pressure from the public, Singapore transitioned towards a mitigation strategy in September 2021, with consequent dramatic increases in new case and fatality rates.²⁰

Suppression

The suppression strategy was utilized in countries including Argentina, Uganda and the United States. By the middle of November 2021, cumulative COVID-19 fatalities per million people in Argentina and the US were among the highest in the world.

Uganda was unique among countries utilizing the suppression strategy, with a relatively low fatality rate.

Case-based interventions varied in each of these three countries. Based on available resources and the epidemiological situation in each country, there were variations in guidance on testing eligibility. In Argentina and the US, high-risk groups received highest priority for testing during the first half of 2020, and testing services were conducted in private laboratories. To meet growing demand, Uganda purchased testing kits from other countries and modified existing laboratories to make them appropriate for testing COVID-19. Limitations in the number of appropriate testing sites, laboratories and test kits limited the testing capacity of countries utilizing the mitigation strategy.

In each of the countries employing the mitigation strategy, there were various approaches and policies regarding contact tracing. In the US, contact tracing was delegated to states and counties, increasing the variety of policies and methodologies used and contributing to inconsistencies in data collection and analysis.³² Consistent contact tracing was not implemented in Argentina until May 2020. Financial pressures and the rapid increase in COVID-19 cases interfered with consistent and accurate contact tracing in Uganda and the US. As contact tracing accuracy rates became less accurate, the US adopted 'syndromic surveillance,' a strategy in which cases meeting the clinical definition of COVID-19 were monitored in the absence of testing.³²

Population-based interventions also varied widely. In March of 2020 during the early phase of the pandemic, Argentina, Uganda and the US attempted to contain community transmission of COVID-19 through intensive population interventions. In March 2020, Argentina implemented a national lockdown order, with few exemptions for essential service workers. Late in March 2020, Uganda implemented a national lockdown. In mid-March 2020, in the US, policy-making was delegated to states and counties, many of which implemented stay at home orders that remained in place for four to eight weeks.³³ During this time frame, the use of face masks was introduced in each of these three countries. However, there was very little uniformity of what type of mask should be used. Thin fabric masks

became widely used, although subsequent data indicated that they are the least effective type of mask for containing the spread of COVID-19.³⁴ In April and May 2020, based on data demonstrating the efficacy of masks for containing the spread of COVID-19, mask wearing was mandated in Argentina, Uganda, and many US states.²⁰

The suppression strategy reflects an effort to balance the health of the public with the health of the economy. Efforts to stimulate the economy included relaxation of safety protocols when case rates dropped, and in the US, trillions of dollars in 'stimulus checks' being issued to the public.³⁵⁻³⁷

During the early months of 2020, all three countries imposed border control measures including travel restrictions, suspension of flights from high-risk countries and temporary border closures. These measures were gradually eased until they were lifted toward the end of 2020. During the period when travelers were required to show evidence of negative COVID-19 testing to enter the country, quarantine policies varied widely between countries. Travelers to Uganda were isolated in government facilities for 14 days. In the US and Argentina, travelers were permitted to quarantine at home (or in a hotel).²⁰

Argentina, Uganda and the US attempted to engage the community using various media platforms on national and regional levels. Based on its history of Ebola outbreaks, Uganda was employed more stringent policies, including legal consequences for violating safety protocols. The US and Argentina had less recent experience with widespread epidemics, so they were less prepared for COVID-19. In addition, Argentina lacked adequate funding for public health. However, strategic choices and actions in each of these three countries have largely been determined by partisan politics. In the US, political leaders questioned and discredited scientific experts and advisers, delaying the implementation of safety measures, interfering with coordination of efforts, and ultimately leading to significant loss of life.^{38,39} The uniquely significant influence of politics on pandemic management in the US will later be discussed in greater detail.

Mitigation

Early in 2020, Sweden and the United Kingdom both opted for a mitigation strategy for addressing

the COVID-19 pandemic. The relatively lax policies exemplary of the mitigation strategy led to both countries being among those with the highest cumulative COVID-19 fatality rates per million people at the end of 2021.⁴⁰

As the pandemic escalated, the UK transitioned into a suppression strategy. Based on data indicating efficacy of stay-at-home policies and nonpharmaceutical interventions including masking and social distancing, the United Kingdom implemented a strict lockdown on March 23, 2020.^{41,42} Researchers suggested that intervention duration should be determined in relation to specific threat, and that early intervention can prevent initial spikes in COVID-19 contagion and consequently, significantly reduce fatality rates. They suggested that starting the UK lockdown 2 weeks earlier on March 9, 2020 would have suppressed the outbreak of COVID-19 to 5% of the infections that had occurred by March 23, so that most of the UK COVID-19 deaths might have been prevented.⁴³ UK regions and sub-regions employing stricter safety standards (e.g., containing populations within precincts) demonstrated lower case and fatality rates.⁴¹ Due to inadequate testing resources early in 2020, UK patients presenting COVID-19 symptoms were not tested, until testing capacity was increased in May 2020.²⁰

The UK was not free of controversy. Prime Minister Boris Johnson was criticized for being slow to respond early during the pandemic, later contracted COVID-19, and was later sanctioned for his lax posture on COVID "parties" (wherein attendees parties with the intention of flouting or perhaps catching COVID-19).⁴²⁻⁴⁵ Scotland's chief medical officer stepped down following criticisms for breaking her own rules twice to visit her second home early during the pandemic.⁴⁶ Retrospectively, the UK initially utilized a mitigation strategy, but as the pandemic escalated, shifted toward a suppression strategy. UK lockdowns proved efficacious not only for reducing COVID-19 new case, hospitalization and fatality rates, but also reducing hospitalization rates for non-COVID diseases.^{47,48} Eventually, however, public impatience with safety protocols and divided political parties led to premature easing of safety protocols and policies in the UK, leaving the country in an ongoing cycle of COVID-19 surges.⁴⁹

Early in 2020, case-based interventions in Sweden were absent or delayed, including government

efforts to increase capacity for COVID-19 testing and contact tracing. In February 2020 Sweden imposed COVID-19 testing for inbound travelers from high-risk countries, and later, for groups considered at-risk or high priority (including healthcare workers). These efforts led to a shortage of testing resources in several parts of the country. Similarly, Sweden's inconsistent and delayed contact tracing policies interfered with COVID-19 containment. Sweden implemented contact tracing early in 2020, but the agenda was dropped within a few weeks due to limited availability of personnel. In March of 2020, the UK abandoned contract tracing, which was resumed with an influx of government funding in May 2020, but not even one in eight confirmed COVID-19 cases was adequately traced.³² The UK and Sweden eventually shifted to large-scale or "sentinel" surveillance models.²⁰

Sweden and the UK initially imposed minimal population-based interventions, which became more stringent as COVID-19 new case and fatality rates increased. The Swedish government encouraged social distancing, but did not impose lockdowns. Sweden and the UK prohibited large social gatherings. With rising case rates, the UK eventually adopted a suppression strategy including a lockdown in March 2020, but with new case rates leveling off, the lockdown was relaxed in June 2020. In the absence of data demonstrating efficacy, neither country recommended or required the use of facial masks during the first half of 2020. In June 2020 the UK mandated the use of facial masks, but Sweden did not. During the pandemic, economic support was approved by the governments of both countries. In the UK, people who lost their jobs consequent to the pandemic were paid wages by the government. In Sweden, the government offered small business loans.²⁰

Early in 2020, neither Sweden nor the UK employed border control, and neither country required symptom-free inbound travelers to be tested or quarantined for COVID-19. The UK discouraged travel into countries considered high-risk, but did not seal its borders or prohibit such travel until June 2020, when incoming travelers were required to self-isolate for 14 days, similar to the strategy employed in the US.²⁰

Minimal community engagement has been utilized by the governments of Sweden and the UK, who employed media platforms for risk communication.

The Swedish Public Health Agency broadcast information through television and internet platforms, held weekly press conferences, and set up hotlines and digital resources to provide migrant people with access to information about COVID-19. In the UK, regular press briefings were used to convey information to the public about the progress of the epidemic and policies imposed in an effort to contain it.²⁰

Strategic choices and actions in the UK and Sweden were influenced by numerous factors, including Sweden's constitutional leaning toward minimal governmental intervention and consensus among Swedish politicians to adopt a more relaxed response to the pandemic. The government in the UK adopted a "wait and see" approach, issuing reassuring public statements even as new case rates dramatically increased. This approach led to public confusion when safety protocols were imposed. The public believed that they had been given mixed messages and were unsure what to believe.²⁰

Comparing strategies and outcomes: Aggressive containment, suppression and mitigation

Each of the three general strategies (aggressive containment, suppression and mitigation) has its benefits, drawbacks, and compromises. Aggressive containment's notable potential drawback is economic hardship due to business closures or limitations as a consequence of stringent policies. As it turns out, regardless of which strategy was employed, all countries found it necessary to provide similar forms of economic support to the public, supporting data indicating that aggressive containment can protect economies by reducing uncertainty, allowing for faster economic recovery, consequently reducing government spending on economic relief and reducing cost due to COVID-19 comorbidities and fatalities.^{20,50-52} Specifically, countries adopting aggressive containment strategies demonstrated economic growth during the third and fourth quarters of 2020. During the same time frame, countries employing suppression or mitigation strategies demonstrated consistent declines in gross domestic product (GDP). During the first year of the pandemic, countries adopting aggressive containment had more consistent weekly GDP and faster economic recovery, consistent with the premise that aggressive containment is more effective for ensuring the public's physical and economic well-being than either the suppression or mitigation strategies.⁵³

Aggressive containment has its limitations. Less affluent nations lack the resources necessary to rapidly expand health care system capacity and mobilize resources, which are necessary components of the aggressive containment strategy. Aggressive containment has also been widely criticized for infringing on privacy and restricting civil liberties.⁵⁴ Conversely, it can be argued that civil liberties can be quickly restored. Data suggest that civil liberties were more impacted in countries employing suppression or mitigation strategies, where reactive measures including mobility restrictions were strictly enforced.⁵⁵ Aggressive containment also has the potential to severely disrupt commerce, employment and access to social and healthcare services, leading to social and economic costs even when lives are saved.⁵⁶

Suppression strategies are effective for short-term containment and disease burden on healthcare systems. However, suppression strategies are prone to lifting safety protocols without eliminating community transmission, leading to subsequent 'surges' in COVID numbers and high fatality rates. Perhaps of greater concern, on-again off-again public safety policies can be perceived by the public as confusing and exhausting mixed messages, increasing the likelihood of noncompliance in successive waves of the pandemic, which is exactly what has been observed in the US.⁵⁷

Employing the suppression strategy, Argentina and the US experienced severe economic upheavals, slow economic recovery and some of the highest fatality rates in the world. Uganda had lower fatality rates, but more economic upheaval. Developing countries face economic challenges that might outweigh potential benefits of the suppression strategy.⁵⁸⁻⁶⁰

The mitigation strategy had the benefit of preserving civil liberties including mobility. However, lax safety protocols created high risk, especially for at-risk populations including older adults, and in fact led to excess deaths in both Sweden and the UK.⁵³ Both countries also experienced significant economic downturns and slow economic recovery.

The authors of the study described above concluded that the optimal strategy for sparing both lives and the economy is containing community transmission.

They recommend immediate action in response to the outbreak of a disease, and patience before easing public health interventions, because prematurely doing so demonstrably leads to successive waves of disease outbreak, increased fatality rates and greater damage to the economy.^{61,62} Effective population-based interventions include increasing public health capabilities, lockdowns to limit community transmission, socioeconomic support, border control, case tracing, and isolation of infected individuals. Effective case-based interventions include quarantine, for which compliance can be improved when support is provided, e.g., food deliveries and additional financial support to people in isolation.⁶³ They also recommend basing the easing of safety protocols on explicit indicators. The authors acknowledge that this can only be achieved when the necessary components of an aggressive containment strategy model exist in a national society: strong, unified political will and receptiveness to scientific input, a well-prepared health system, and utilization of public health interventions based on trust that meaningfully engage the community.²⁰ Which leads to the question, how and why were the necessary components of an aggressive containment strategy lacking in the United States?

COVID-19: Politics and Policy in the United States

Despite the rapid action undertaken in many countries in January 2020 in response to COVID-19, US President Trump dismissed the threat of pandemic, and referred to criticisms of his refusal to take action as "a new hoax."⁶⁴ When the first case of COVID-19 was confirmed in the US on January 22, 2020, the president delayed federal action, and made comments to the public denigrating scientific evidence and providing false reassurances.⁶⁵ Between January and March 2020, President Trump likened COVID-19 to seasonal influenza, denying the possibility of serious epidemic risk in the US. His statements to the American public were unrealistic attempts to provide reassurance, e.g., "We think it's going to have a very good ending for us" (January 30, 2020),⁶⁶ and "We have it very much under control in this country" (February 23, 2020).⁶⁷

COVID-19 was recognized by the US Department of Health and Human Services (HHS) as a serious threat to national public health and safety, and on January 27, 2020 a Public Health Emergency was

declared.⁶⁸ Although news stories of outbreaks in China and Italy represented a looming threat, the first possible instance of community spread COVID-19 in the US was not reported until February 2020 in San Francisco, California.⁶⁹ The mayor of San Francisco immediately declared a citywide state of emergency, joining other California regions including Santa Clara, Orange and San Diego counties.^{70,71} The state of emergency was declared in response to February 26, 2020 warnings from Dr. Nancy Messonnier, a top official at the Centers for Disease Control and Prevention (CDC) and director of the National Center for Immunization and Respiratory Diseases (NCRID), who stated “It’s not so much a question of if this will happen anymore, but rather more a question of exactly when this will happen and how many people in this country will have severe illness.”⁷²

The following day on February 27, 2020, President Donald Trump held a televised press conference in which he stated that the US response to the covid-19 outbreak was “a tremendous success,” and stated that the risk to Americans was “very low.” He also said that the US was “very ready” and the best prepared country in the world for addressing COVID-19. He promoted testing people from infected regions, quarantining people considered at risk, and pursuing vaccine development, which he described as “rapidly” advancing. He went on to say that there was strong control at US borders, so it was not the right time to restrict travel from affected countries. He also defended his 80% cut to the pandemic response team.⁷³ President Trump’s statements were in direct contradiction to the warnings issued the previous day by the CDC, comments from CDC principal deputy director Anne Schuchat, who said that the country could expect more cases and should prepare for a possible pandemic, and Anthony Fauci, head of the National Institute of Allergy and Infectious Diseases, who said that a vaccine for widespread use could not be available for 12 to 18 months.⁷³

The President’s policy comments were also inconsistent with US State Department warning about travel to China, South Korea, Japan, Italy, Iran, and Hong Kong, and cautions about travel to Singapore, Thailand, Taiwan, and Vietnam.⁷⁴ These initial contradictions and mixed messages represent the beginning of an ongoing pattern of mixed messaging and disparity between expert advice based on epidemiological scientific evidence and official US COVID-19 policy.

Within days, US COVID-19 cases increased rapidly. Speculation that undocumented infection led to the rapid spread of COVID-19 appeared accurate, and the term ‘stealth transmission’ was coined.^{75,76} On March 10, 2020, President Trump announced that in an attempt to stop the spread of COVID-19 to the US, the US would be closed for 30 days to all flights from Europe, with the exception of flights from the UK.⁷⁷ On March 11, 2020, he told the American public, “The virus will not have a chance against us. No nation is more prepared, or more resilient, than the United States.”⁷⁸

It is important to note that prior to the COVID-19 pandemic, the Trump administration had reduced the nation’s pandemic response capabilities in several ways. Perhaps in an effort to distance itself from the previous administration, in May 2018 the Trump administration eliminated the White House global health security office, an inter-agency pandemic preparedness program established by the Obama administration following the 2014-2016 Ebola epidemic.⁷⁹ Late in 2019, the Trump administration cancelled PREDICT, a global early warning program designed to identify viruses with pandemic potential.⁸⁰ Significant cuts were also made to critical programs within the CDC. In a joint project, The Climate Science Legal Defense Fund and Columbia Law School’s Sabin Center for Climate Change Law developed The Silencing Science Tracker,^{81,82} which reports attempts by federal, state, and local governments to “restrict or prohibit scientific research, education, or discussion, or the publication or use of scientific information (“anti-science actions”).”⁸³ Between President Trump’s election and President Biden’s inauguration (from November 8, 2016 to January 20, 2021), 346 anti-science actions were undertaken by the federal government. During the same period, an additional 156 anti-science actions were taken by state and local governments.⁸³ These program cuts and eliminations demonstrate the Trump administration’s historical rejection of evidence-based findings and expert advice for making public health policy decisions.⁸⁴

The Trump administration failed to take action during the latency period of several weeks between COVID-19’s initial detection in Wuhan, China late in 2019, and the first confirmed case of COVID-19 in the US on January 22, 2020. China’s strategy of aggressive containment, including quarantine and

lockdown, slowed the transmission of the virus to other countries, and provided time for the US to increase its pandemic preparedness. The Trump administration might have taken advantage of this time to institute widespread COVID-19 testing and contact tracing, rapidly increase production of personal protective equipment (PPE) for health workers, promote funding for expansion of hospital capacity, and set up clear chains of communication between the federal government and state governors. None of these actions were undertaken by the Trump administration.⁸⁵

Consequently, as COVID-19 cases began to increase in the US, health workers experienced severe shortages of PPE. Surgical masks were reused, and the CDC advised the wearing of bandanas or other cloth facial barriers because no adequate, genuine PPE was available.⁸⁶ In efforts to procure PPE and critical hospital equipment including ventilators, state governors competed in “an ‘eBay-style’ bidding war.”⁸⁷ Hurried efforts led to the CDC’s development of an inaccurate COVID-19 test, and critical weeks passed before it was apparent that the test’s findings were faulty, and a newer, more accurate test could be made available.⁸⁸ Had the Trump administration participated in the global effort to contain COVID-19, for months the US could already have been using an accurate WHO-approved COVID-19 available worldwide.⁸⁵

During the pandemic, President Trump’s anti-scientific rhetoric had consequences extending beyond domestic health policy. On February 28, 2020, President Trump assured the American public that COVID-19 would soon disappear on its own “like a miracle.”⁶⁵ On March 21, 2020, President Trump called for “immediate” use of the anti-malarial drug hydroxychloroquine as a COVID-19 treatment, although there was no scientific evidence of the drug’s effectiveness for treating COVID-19.⁸⁹ President Trump’s call for the widespread use of hydroxychloroquine to combat COVID-19 led to shortages of the medication for the treatment of other conditions for which it has demonstrated efficacy, including lupus.⁹⁰ It also led to “panic-buying, skyrocketing prices, and overdoses in malaria-prone regions in Africa and South Asia.”⁹¹ President Trump removed the director of the US agency that oversees COVID-19 vaccine development because he questioned the president’s promotion of hydroxychloroquine.⁹² When the CDC advised the public to wear face masks, Trump said

he would not wear one. On April 23, 2020, President Trump suggested directly injecting, inhaling or ingesting disinfectant to combat COVID-19, to bring “light inside the body.” Concerns about people poisoning themselves by inhaling, ingesting or injecting bleach forced health experts to issue national warnings to the public.⁹³

President Trump’s use of social media for messaging to the public became part of a phenomenon known as the “infodemic:” continuous, around the clock news and commentary about the pandemic, distributed not only by news media, but also by social media. COVID-19 is the first pandemic in history in which technology and social media are being used on a massive scale. An infodemic is defined as “an overabundance of information, both online and offline. It includes deliberate attempts to disseminate wrong information to undermine the public health response and advance alternative agendas of groups or individuals. Mis- and disinformation can be harmful to people’s physical and mental health; increase stigmatization; threaten precious health gains; and lead to poor observance of public health measures, thus reducing their effectiveness and endangering countries’ ability to stop the pandemic.”⁹⁴⁻⁹⁸

Since the onset of the COVID-19 pandemic, unprecedented use of social media has provided a platform for unprecedented expression of racism, stigmatization, and xenophobia. These combined factors have had a significant impact on the mental health of the public, including anxiety, panic, paranoia, depression, obsessive behaviors, hoarding, and post-traumatic stress disorder (PTSD).^{99,100}

President Trump’s anti-scientific rhetoric also shaped public opinion, encouraging a faction of Americans to oppose governmental safety protocols based on beliefs that the protocols violated personal rights.¹⁰¹ In April 2020, President Trump encouraged his supporters to participate in mass public protests to “liberate” states residents from stay-at-home orders. He specifically targeted states with Democratic governors.¹⁰² President Trump added that it was “an appropriate time” to consider the second amendment, the right of US citizens to bear arms. Washington state governor Jay Inslee said that the president was encouraging armed insurrection, “putting millions of people in danger of contracting COVID-19. His unhinged rantings and calls for people to ‘liberate’ states

could also lead to violence.”⁹³ Governor Inslee’s comments were strangely prescient of the January 6, 2021 armed assault on the nation’s capitol.^{103, 104}

In April 2020, debates over social distancing, the use of face masks in public and other COVID-19 safety protocols led to a constitutional showdown between US states and the federal government. President Trump had promised to reopen the economy by April 12, 2020, in violation of regional business closures and stay at home orders. State governors refused to capitulate. On April 13, 2020 President Trump asserted that he would reopen the economy, because “the president of the United States calls the shots” and “When somebody’s the president of the United States, the authority is total.” Three days later, he conceded states’ rights and told state governors “You are going to call your own shots.” During the week of April 12, 2020, state coalitions were formed to address COVID-19 in a coordinated manner. Each coalition represented over 50 million people. The western coalition included California, Oregon, and Washington state. The north eastern coalition included New York, New Jersey, Connecticut, Pennsylvania, Delaware, and Rhode Island, later joined by the first Republican governed state, Massachusetts in anticipation of rising COVID-19 cases. Later that week, a third coalition was formed including Michigan, Wisconsin, Minnesota, Illinois, Kentucky, and Republican-governed Ohio and Indiana. The formation of interstate coalitions reinforced the rights of states to self-govern, weakening President Trump’s influence over the course of the pandemic. His proposed May 1, 2020 deadline for ‘reopening the country’ came and went, as state coalitions refused to follow guidance that was inconsistent with scientific evidence.¹⁰⁵

During the same time frame, President Trump received increased support from governors in the most conservative Republican states, which tend to be more rural, less densely populated, and consequently have fewer COVID-19 cases, making it possible ease restrictions earlier. Several “red” states never locked down, later leading to widespread COVID-19 outbreaks. Nonetheless, the President’s treatment of the pandemic heightened tensions between political parties, producing unprecedented societal fragmentation. Many governors were openly challenged in their own states by the dominant opposition party. The president cultivated a cult of personality drawing upon a very conservative base with extreme

political leanings. During the second week of April 2020, state capitols in Pennsylvania, Michigan, Kentucky and Ohio were overrun by organized demonstrations against social distancing, masking and other COVID-19 safety protocols. The crowds wore Make America Great Again” or “MAGA” hats and shirts and other Trump merchandise, and carried Confederate flags. Kentucky’s Democratic governor was shouted down, and Michigan’s Democratic governor was physically threatened.¹⁰⁵

By mid-May 2020, President Trump was in open conflict with American health experts and agencies. The president publicly criticized Anthony Fauci, head of the National Institute of Allergy and Infectious Diseases, who testified in a Senate hearing advising against reopening states that had not met the administration’s published criteria for doing so. Fauci stated that premature re-openings would lead to “needless suffering and death.” Republican Senator Rand Paul argued with Fauci about school re-openings, a key issue for the public and a specific concern for Fauci, who repeated the rapid transmissibility potential in public school classrooms, and potential health dangers specific to children. President Trump later told reporters that Fauci’s position was “not an acceptable answer, especially when it comes to schools.” President Trump added that the importance of COVID-19 testing was “overrated” as an intervention. President Trump subsequently prevented Fauci from testifying before the House of Representatives.¹⁰⁶

On May 13, 2020, Wisconsin’s conservative state Supreme Court overturned the Democratic governor’s stay at home and masking orders, and unmasked crowds filled bars that evening, marking a turning tide of public opinion favoring self-perceived ‘freedom’ over scientific evidence. President Trump tweeted, hailing the event as a “win” and further currying favor with his supporters. Wisconsin’s Democratic governor Tony Evers told reporters “We’re the Wild West. There are no restrictions at all across the state of Wisconsin. So at this point in time . . . there is nothing compelling people to do anything other than having chaos here.” In key swing state Pennsylvania, President Trump also encouraged insurrection. He tweeted: “The great people of Pennsylvania want their freedom now, and they are fully aware of what that entails.” Counties all over Pennsylvania reopened bars and other businesses in direct violation of orders from Democratic governor, Tom Wolf. Wolf threatened to withhold state funds.¹⁰⁵

Significantly, May 2020 marked the growth of societal fragmentation to extended not only between states and the federal government or between one state and another, but between factions of citizens within the same state.^{107,108}

The pattern of social unrest increased during 2020. By September, President Trump had accused FDA scientists of participating in a “deep state” conspiracy to harm him politically. White House Chief of Staff Mark Meadows acknowledged that the Trump administration wanted the FDA to “feel the heat.” The administration pressured the FDA to issue at least three Emergency Use Authorizations (EUAs). The first was for hydroxychloroquine, which the president had promoted as a “game changer” for treating COVID-19. Despite a lack of scientific evidence to support its use, on March 30, 2020 FDA Director Stephen Hahn gave in to presidential pressure and granted an EUA for hydroxychloroquine. Millions of dollars later, the drug was shown to be ineffective for the treatment of COVID-19, and on June 15, 2020, the FDA retracted its EUA. The second EUA sought by the administration was for the use of convalescent plasma. National Institutes of Health (NIH) scientists Anthony Fauci and Francis Collins opposed the idea and urged time for research. Coincidentally, Fauci had to take a leave of absence for surgery on his vocal cords. The White House Coronavirus Task Force promoted convalescent plasma as a major breakthrough and pressed the FDA for an EUA. FDA director Hahn misstated findings in a press conference, later attempted to retract his comments, but ultimately left the public confused and disappointed. Effectively, President Trump had achieved a victory in creating greater confusion, and putting scientists on the position of arguing over details that the public doesn’t understand, thereby marginalizing the impact of scientific input in the decision-making process. The third EUA sought by the administration was for a COVID-19 vaccine. The FDA was under pressure to provide an EUA by October 2020, although vaccine developers and experts including Anthony Fauci had consistently stated since February 2020 that the process of vaccine development (including field trials) would take twelve to eighteen months.⁷³ The White House used the opportunity to make the NIH, the CDC, the FDA and the scientific community look incompetent, uncooperative, and/or intentionally divisive. The intermingling of pandemic policy with partisan politics had achieved new heights.¹⁰⁹

The November 2020 presidential election took place as COVID-19 numbers spiked around the world and in the US. US COVID-19 hospitalizations were at an all-time high of more than 60,000.¹¹⁰ The results of the presidential election in November 2020 were never accepted by Donald Trump.^{111,112} Donald Trump’s attention was wholly dedicated to efforts to deny and reverse the outcome of the election. Trump disputes President Biden’s 311,000 vote margin of victory and questions the validity of mail-in ballots, an issue which has taken on a life of its own and is viewed by many as a political agenda to seize control of the election process.^{113,114} Trump’s supporters echo his rhetoric, and have engaged in numerous protests, rallies, and acts of violence, including the insurrection at the nation’s capitol on January 6, 2021.¹⁰³

When President Biden took office, he initiated a number of programs addressing the COVID-19 pandemic, which have evolved over time. These included “a decisive public health response that ensures the wide availability of free testing; the elimination of all cost barriers to preventive care and treatment for COVID-19; the development of a vaccine; and the full deployment and operation of necessary supplies, personnel, and facilities” and “A decisive economic response that starts with emergency paid leave for all those affected by the outbreak and gives all necessary help to workers, families, and small businesses that are hit hard by this crisis. Make no mistake: this will require an immediate set of ambitious and progressive economic measures, and further decisive action to address the larger macro-economic shock from this outbreak.”^{115, 116}

During his State of the Union address in March of 2022, President Biden reviewed his administration’s success in meeting several of the goals specified in his campaign platform. These included making COVID-19 test kits available to the public at no charge, promoting the development of COVID-19 vaccines, providing support for the expansion of health care facilities, and providing financial assistance to individuals and businesses impacted by the pandemic.¹¹⁷

In the midst of political turmoil and globally spiking COVID-19 numbers, the first COVID-19 vaccine to be made available in the US was the Pfizer-BioNTech COVID-19 vaccine, granted an FDA EUA on December 11, 2020. The same vaccine was first to receive full FDA authorization for use by people

aged 16 years or older on August 23, 2021. The FDA later granted authorization for the use of that vaccine with children as young as six months old.¹¹⁸ On December 18, 2020, the FDA issued an EUA for the Moderna COVID-19 vaccine for individuals 18 years of age and older. The FDA later granted full approval, and later, authorized the use of the vaccine for children as young as six months old.¹¹⁹ On February 27, 2021, FDA issued an EUA for the Janssen COVID-19 Vaccine to prevent COVID-19 in individuals 18 years of age and older. Due to emerging data indicating significant risk of thrombosis and other complications, on May 5, 2022, the U.S. Food and Drug Administration limited the authorized use of the Janssen COVID-19 Vaccine to individuals 18 years of age and older for whom other authorized or approved COVID-19 vaccines are not accessible or clinically appropriate, and to individuals 18 years of age and older who elect to receive the Janssen COVID-19 Vaccine because they would otherwise not receive a COVID-19 vaccine.¹²⁰

In the US, hope had been held out that the vaccines would be a “game changer” in the battle against COVID-19. Partisan politics and regional attitudes eventually proved to be more important than scientific evidence for a vast percentage of the American population, who chose to remain unvaccinated. Remaining unvaccinated correlates with rural areas, areas with lower educational attainment, and areas with a significantly high Trump vote share.¹²¹ Research also indicates that anti-vaccination supporters, in comparison with pro-vaccination supporters, share conspiracy theories, are more engaged in discussions on Twitter and share their contents from a pull of strong influencers, make use of emotional language and rely on a strong sense of community, and also, that Donald Trump, before his profile was suspended, was the main driver of vaccine misinformation on Twitter.¹²²

Consequently, the rate of US COVID-19 vaccination rose rapidly during the first few months of 2021, but stalled in mid-2021. At the beginning of 2022, US full vaccination rates were at 63.6% They crept slowly upward over the next six months to about 66.9% on June 21, 2022.¹²³ These figures, however, are somewhat misleading. COVID-19 vaccinations lose efficacy over time, as antibody production is reduced.¹²⁴ Although each vaccine is somewhat different, they all lose effectiveness after about six months, and require booster dosages at regular intervals to maintain efficacy.¹²⁵⁻¹²⁷

Accordingly, the pertinent statistic in evaluating what percentage of the US population has current antibody resistance to COVID-19 is not the ‘fully vaccinated’ percentage, but rather, the percentage of the population that has remains current on booster vaccinations. On June 20, 2022, only 47.3% of the US population had received an initial booster dose. Among people at least 50 years of age, 26.1% had received a second booster shot, and among people at least 65 years of age, 32.7% had received a second booster shot. Second vaccine booster statistics for Americans younger than age 50 are unavailable, because the booster shots are rolled out over time with highest priority assigned to the oldest members of the population, who are at highest risk for serious health consequences from COVID-19.^{3-6,22,23,123,130}

The data indicate that less than a third of older adults in the US have current antibody protection against COVID-19. Due to the absence of data, it is impossible to know what percentage of Americans under the age of 50 have had a second booster shot. The absence of data suggests that the percentage of Americans under the age of 50 staying current on booster shots is not large enough to be measured. This is a startling statistic and should be of grave concern. It suggests that the vast majority of the American population is currently without adequate antibody production to mount meaningful resistance to COVID-19.^{123, 127}

This appears to be the case, as indicated by the fact that COVID-19 case rates in the US continue to peak periodically, with the most recent surge in January and February 2022. On January 13, 2022, the daily new case rate was 869,415, and the 7-day average daily new case rate was 802,191, almost triple the highest numbers achieved up to that time, with the previous peak during the surge in late 2020 into early 2021. At the end of June of 2020, early in the pandemic when no vaccines were available, the average daily case rate was 68,948 and the 7-day average daily new case rate was 64,649. At the end of June 2021, after the initial introduction of COVID-19 vaccines, the daily new case rate was 15,729 and the 7-day average daily new case rate was 12,263. At the end of June 2022, after a year and a half of vaccine availability and experience in COVID-19 management, the daily new case rate was 170,882 with a 7-day average new daily case rate of 97,830.¹³¹ The June 2022

daily new case rate was more than ten times greater than that in June 2021, and the June 2022 7-day average daily new case rate was almost eight times higher than the June 2021 rate.

The impact of vaccination was mitigated by the emergence of COVID-19 mutant strains, or variants, which began almost at the outset of the pandemic. By March 2020, at least seven different strains of COVID-19 had been identified in the US.¹³² The increasing rate of mutation is responsible for increasing rates of viral transmission.¹³³ The proliferation of variant COVID-19 strains has debunked the 'herd immunity' hypothesis, which posits that as a contagion moves through a population, members of that population produce antibodies that defeat the contagion and resolve symptoms, eventually leaving the contagion without new hosts so that the contagion 'dies off.' However, COVID-19 reinfections began to appear in 2020, including fatal outcomes, leading the scientific community to label 'herd immunity' "a dangerous fallacy unsupported by scientific evidence."¹³⁴⁻¹³⁶

Also inconsistent with the herd immunity hypothesis is the growing list of potential long-term consequences of COVID-19 infection. These include but are not limited to: impairment of organ function including cardiac,¹³⁷ kidney,¹³⁸ skin,¹³⁹ eyes,¹⁴⁰ the peripheral nervous system,¹⁴¹ and the central nervous system¹⁴²; increased risk for Alzheimer's Disease and Parkinson's disease¹⁴³; hypertension¹⁴⁴; blood disorders¹⁴⁵; cognitive impairment¹⁴⁶ and neuropsychiatric deficits¹⁴⁷; anxiety, depression, obsessive-compulsive disorder, and post-traumatic stress disorder.¹⁴⁸ The exacerbation of comorbidities is also an important part of understanding COVID-19's potential for life-altering or life-ending impact.^{149,150}

Long COVID also poses threats to health and longevity. Long COVID is characterized by a range of symptoms, which typically include shortness of breath, fatigue, fever, headaches, "brain fog" and other neurological problems. After initial COVID-19 diagnosis, these symptoms last for many months or longer.^{151,152} Early data estimated the frequency of long COVID at 5-6%,¹⁵³ but comprehensive research over the span of the pandemic indicates that the rate of long COVID is at or above 30%.¹⁵⁴ However, American media have downplayed or dismissed COVID-19's impact on comorbid conditions, the potential long-term health

consequences and the relatively high rate of long COVID.¹⁵⁵

The reduction in COVID-19 case rates between 2020 and 2021 appears to be attributable to the introduction of COVID-19 vaccines, because other non-pharmaceutical interventions had not changed significantly between June 2020 and June 2021. Population-based interventions included stay at home orders, mandatory use of face masks, school closures, limited business openings, social distancing (especially in business settings), and a ban on large venue events (sports arena events, rock concerts, large festivals).³³ Case-based interventions included priority COVID-19 testing for high-risk individuals and quarantine for infected individuals, and border control measures included limiting flights entering the US from other countries.³²

In the context of widespread vaccination and a year and a half of experience in COVID-19 management, why were COVID-19 daily new case rates higher in June 2022 than in June 2021? The answer might lie in part with changes in vaccination patterns between 2021 and 2022 (described above), wherein a 66.9% majority of the American population went through the initial two-injection vaccination process, but only 47.3% have had an initial booster, and an unknown much smaller percentage have had the second booster.^{123,127} The drop in vaccination booster follow through is in large part a consequence of unclear messaging to the public about how vaccines work, and the importance of staying current on booster vaccines. This failure is part of a larger failure on part of government to effectively engage the community in pandemic containment efforts.

Perhaps of greater importance, beginning in June of 2021 the US also dropped non-pharmaceutical interventions including population- and case-based interventions. Recall that the South Korean government employed an aggressive containment strategy with an emphasis on case-based and population-based interventions.^{128,129} These included drive- and walk-through diagnostic testing, extensive contact tracing, use of technology to provide mobile applications from both government agencies and private developers that provided the public with information about the location of testing centers, trajectories of confirmed cases using digital maps, and similarly tracking the health status and location of visiting travelers and others with high risk of exposure, quick adaptation of transportation

infrastructure and location-based information technology.²⁴⁻²⁶ Taiwan also employed an aggressive containment strategy including rapid mobilization of case tracing, expanding the capacity of public health facilities, integrating data from the national health insurance (NHI) database with immigration and customs databases, issuing real-time alerts during a clinical visit based on travel history and clinical symptoms to aid case identification, novel technologies including QR code scanning and online reporting of travel history and health symptoms, text messages to notify travelers of their risk status, tracking movement of quarantined individuals through their mobile phones, using NHI data to proactively test people considered at risk, providing a toll-free telephone number as a hotline to report COVID-19-like symptoms, and provision of food, moral support and health checks to those in quarantine.²⁷

The US employed none of these strategies. On the contrary, as early as 2020 domestic tensions escalated over safety protocols.¹⁵⁶ During 2021, the American public became increasingly impatient and frustrated with school closures, stay at home orders, limited access to restaurants, sports arenas, and other large-venue events.¹⁵⁷⁻¹⁶² The emergence of new COVID-19 variants produced surges in numbers,¹⁶² and growing evidence that COVID-19 was airborne¹⁶³ slowed or reversed re-openings of businesses, frustrating the public.¹⁶⁴ Open acts of civil disobedience became popular, especially in “red” states or conservative regions responsive to the President Trump’s encouragement to defy state or regional COVID-19 safety protocols, notably including church groups.¹⁶⁵⁻⁶⁷ Guidelines for school openings were the subject of intense research and policy consideration.¹⁶⁸ School children tend to develop less severe COVID-19 symptoms, but they transmit COVID-19 to other family members including high-risk populations like older adults. Functionally schools are petri dishes for COVID-19 incubation, and school children carry COVID-19 out into the community.^{169,170} Parent groups protested school closures, school masking and social distance policies, focusing less on scientific evidence and perceived COVID-19 risk, and more on the importance of children being in the classroom, for reasons including quality of education, socialization, and loss of work to supervise children at home. Protests, angry parent groups and legal actions over school closures and masking policies led to US schools reopening in the fall term of 2021.¹⁷¹⁻¹⁷⁸ Despite more than two years of scientific evidence

demonstrating the effectiveness of facial masks for containing the spread of COVID-19, many school districts gave in to pressure from parental groups, so that guidelines and policies regarding masking or social distance have become inconsistent or nonexistent.^{179,180}

Since 2020, efforts to contain COVID-19 have also been hampered by “super spreader” events: large gatherings in which mass transmission of the Coronavirus can occur from even a single infected person.¹⁸¹ Super spreader events, large and small, have continued all over the world since 2020, but especially in the US, where holiday family gatherings (and travel to get to them), parties, sports events and concerts have proven an irresistible draw, overriding guidance and mandates from health agencies and governments.¹⁸²

US public sentiment against COVID-19 safety protocols transformed for some into personal targeting of prominent health care officials. Anthony Fauci, head of the National Institute of Allergy and Infectious Diseases and CDC Director Rochelle Walensky have each received death threats against their families and themselves.^{183,184} The death threats seem an expression of desperation, but perhaps also demonstrate the lasting impact of former President Trump’s public blaming, demeaning and marginalization of COVID-19 health care experts.^{105,106} Research indicates that COVID-19 policy varies in correlation with regional politics.¹⁸⁵ Compliance with safety protocols including social distancing correlate with income level, less affluent people demonstrating lower levels of compliance with safety protocols and mandates.¹⁸⁶ Cooperation with COVID-19 safety protocols also correlates with political affiliation and identification, a phenomenon exacerbated by selective exposure to conservative social media.¹⁸⁷ Affiliation with more conservative politics is associated with higher COVID-19 fatality rates.¹⁸⁸

Despite the science, the loss of life and the clear messaging from health care experts, COVID-19 safety protocols and mandates have all but disappeared in the US. On April 18, 2022 a US federal judge removed mask mandates for public transportation including trains and airplanes,^{189,190} prompting national retailers to follow suit.¹⁹¹ In May 2022, American COVID-19 fatalities exceeded one million.¹⁹² Dr. Fauci has been direct about the

extent to which poor compliance with vaccination and other safety protocols contributed to the high number of US COVID-19 fatalities.¹⁹³ COVID-19 continues to spread in the United States.

Discussion and Conclusions

Since the emergence of COVID-19 late in 2019, the United States has been slow to respond and inconsistent in its pandemic containment strategy. Without labeling it as such, the US initially employed a suppression strategy intended to contain the pandemic with minimal negative impact on the economy, including case-based interventions, population-based interventions, and border control measures.³² The US has yet to employ technology for rapid communication with the population in ways that have worked well for South Korea and Taiwan.²⁴⁻²⁷ US contact tracing efforts have been inconsistent and of late, all but abandoned.³² US lockdown or stay-at-home orders, which have demonstrated effectiveness during COVID-19 surges for containing contagion, have also been abandoned.³³ US masking protocols with demonstrated efficacy for containing the spread of COVID-19 have been dropped.^{20,179,180} The three rounds of stimulus checks intended to boost the US economy cost the government and thus the American public five trillion dollars, arguably contributing significantly to the nation's current state of runaway inflation.⁸⁰ No coherent COVID-19 economic recovery plan has followed. Whatever COVID-19 strategy might once have existed is no longer in evidence. The US has shifted from a suppression strategy to a weak mitigation strategy, reacting to surges with reluctance to impose restrictions on the public in the interest of pandemic containment. Accordingly, the pandemic is currently unrestrained in the US, and the list of long-term consequences of COVID-19 continues to grow, including pulmonary, cardiovascular, hematologic, renal, central nervous system, gastrointestinal, and psychosocial manifestations whose long-term burden on the healthcare system has yet to be determined.^{33,34}

Based on research and available data, it is recommended that the United States government adopt a coherent COVID-19 strategy consistent with the aggressive containment model.²⁰ The two potential shortcomings of the aggressive containment model are impact on the economy and infringement on civil liberties.⁵¹ However, the aggressive containment model turns out to have less long-term impact on the economy than less stringent

strategies.⁵⁰ Data also indicate that civil liberties were more impacted in countries employing suppression or mitigation strategies, including the US, where reactive measures including mobility restrictions were strictly enforced.⁵²

It is specifically recommended that the US employ an aggressive containment strategy that takes more immediate action in response to the outbreak of a disease, and exercises greater patience before easing public health interventions, because prematurely doing so demonstrably leads to successive waves of disease outbreak, increased fatality rates and greater damage to the economy.^{35-37,58,59,131} Population-based interventions might include increasing public health capabilities, targeted lockdowns to limit community transmission, increased socioeconomic support, increased border control, more technology-driven and comprehensive case tracing, and isolation of infected individuals. Case-based interventions might include quarantine, including food deliveries and additional financial support to people in isolation, which have been shown to increase quarantine compliance.⁶⁰ It is also recommended that any easing of safety protocols should be based on explicit indicators including epidemiology data.

The aggressive containment strategy relies on strong, unified political will and receptiveness to scientific input, a well-prepared health system, and utilization of public health interventions based on trust that meaningfully engage the community.²⁰ Despite societal fragmentation, at the outset of pandemic, the US demonstrated the ability to respond to COVID-19 in a unified manner. In early 2020, the American public responded positively to governmental efforts to contain the growth of the COVID-19 contagion, including shelter in place policies leading to the closure of routine businesses including schools, restaurants, and outpatient healthcare facilities.⁷⁻¹¹

Clear and consistent messaging from the US government is recommended, which might include science-based policy decisions; reinstatement of border control policies including requiring vaccination and/or current COVID-19 negative test results for air travel, and quarantine when indicated; limitations on the size of gatherings, and social distancing for restaurants and other businesses; clear explanations and reminders about the importance of booster vaccinations; routines mask mandates in crowded venues, especially

where air is recirculated, as in aircraft; re-evaluation about the viability of large-venue events (professional arena sports, rock concerts) which to date have been super-spreaders; and careful consideration of the structure of school classrooms, employing social distancing and masking mandates for school children.

In addition, the US might adopt the use of technology to keep the public up to date on 'hotspot' regions where COVID-19 numbers are high, encouraging visitor avoidance of such areas and stay-at-home orders for residents; make use of data from Medicare, large private health insurance companies, hospitals, immigration and customs databases to assist contact tracing and issue real-time alerts; use QR code scanning and online reporting of travel history and health symptoms to classify travelers' infectious risks based on flight origin and travel history; use text messages to notify travelers of their risk status and provide low-risk travelers a health declaration border pass directly to their smartphones; quarantining people designated higher risk at home, tracking their movements through their mobile phones to discourage breaking quarantine. The government might also proactively test people considered at risk based on symptom presentation, and establish a toll-free telephone number to provide the public with a hotline to report COVID-19-like symptoms in

themselves or others. These are all strategies with proven effectiveness.²⁷

Without an immediate and decisive change in strategy, the US will continue to be the country with the highest COVID-19 new daily case and fatality rates, and yet-to-be-determined long-term health consequences. The US government has the opportunity to contain COVID-19 and reduce its impact on the economy and the future health of the nation. The time to act is now.

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