



The United States'
Response to COVID-19:
A Case Study of the
First Year





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Preface

One year ago, the WHO declared COVID-19 a pandemic. History will surely consider 2020 as the most calamitous year in health since 1918, when influenza swept the globe. It will also be remembered as the worst economic crisis since the Great Depression. The social consequences of this pandemic will be felt for a long time to come.

The pandemic has affected everyone on the planet, directly or indirectly. So far over 10% of the global population has been infected. With over 10,000 deaths per week, COVID-19 is now the third main cause of death globally; and an estimated 4 million deaths from this pathogen are expected by July of this year. These numbers are likely to be a significant underestimate of the morbidity and mortality and caused during this disease.

Not all regions of the world have been similarly affected. Some countries have performed much better than others. Understanding what elements made a difference and what lessons can be derived is the object of our case study.

In our research of how the U.S. has responded to this pandemic, we find that there are four areas of particular importance. Each of these is highlighted in detail in our report.

First is good governance, which includes institutional strength and effective leadership.

The second is good communication. This means communication from leaders that is clear, accurate and honest and builds trust between the government and its people. The third lesson is that as a global community, we can trust science. With COVID-19, science has once again come to the rescue, delivering innovative vaccines in record time.

Perhaps the most important lesson from this pandemic is that “no country will be safe until all countries are safe.” Global immunologic equity should not only be a humanitarian desire, but a national security concern. To ensure the world is prepared for the next pandemic, we will require more than just a plan; we will require global and national public health institutions to be well-funded with the authority and ability to move nimbly and forcefully in the face of uncertainty. And it will mean that we must think about human health as part of a broader ecologic system that includes the health of our planet, and all the species that live on it.



Jaime Sepúlveda, MD, MPH, MSc, DrSc
Chair, Case Study Committee

Abbreviations

ACA	Affordable Care Act
AI/AN	American Indians and Alaska Natives
BARDA	Biomedical Advanced Research and Development Authority
CARES	Coronavirus Aid, Relief, and Economic Security Act
CDC	Centers for Disease Control and Prevention
CMS	Centers for Medicare and Medicaid
EU	European Union
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
GDP	Gross Domestic Product
HHS	Health and Human Services
ICU	Intensive Care Unit
IHR	International Health Regulations
IHS	Indian Health Services
IPPR	Independent Panel for Pandemic Preparedness and Response
JHE	Joint External Evaluation
LTCF	Long-term Care Facilities
MERS	Middle East Respiratory Syndrome
mRNA	Messenger Ribonucleic Acid
NGO	Non-governmental Organization
NIH	National Institutes for Health
NPI	Non-pharmaceutical Interventions
NSC	National Security Council
OECD	Organization for Economic Co-operation and Development
OWS	Operation Warp Speed
PCR	Polymerase Chain Reaction
PPE	Personal Protective Equipment
RCEP14	Regional Comprehensive Economic Partnership 14
SARS	Severe Acute Respiratory Syndrome
SPAR	Self-Assessment Annual Reporting
U.K.	United Kingdom
U.S.	United States
USCIS	U.S. Citizenship and Immigration Service
WHO	World Health Organization

Executive Summary

The story of COVID-19 in the United States is one of daunting scale. The U.S. epidemic dwarfs that of any other country. At the time of writing,* the U.S. reports over 28 million cases and 500,000 deaths, accounting for 25% of global cases and 20% of global deaths, despite comprising only 4% of the world's population. Life expectancy in the U.S. shrank by a full year in 2020. Had the U.S. responded with the swiftness and effectiveness of East Asia, over 428,000 American lives could have been saved.

The story is also one of great inequity. The pandemic has laid bare existing socioeconomic, health, and healthcare access disparities, with Black and Latinx Americans dying at over 2.6 times the rate of White Americans. In 2020, life expectancy for Black Americans is expected to have dropped by over two years, with Latinx Americans suffering a drop of over three years. While experiencing lower mortality rates from the virus itself, the economic and social consequences have been particularly severe for women, notably women of color. Record numbers of women have left the labor force since the pandemic began. Despite Congress providing over \$3.7 trillion dollars in fiscal relief to support businesses and families, an additional eight million Americans may have slipped into poverty in 2020.

While this report focuses on an assessment of the national response to the virus, the story of COVID-19 is fundamentally about individuals, families and communities. The human impact of the pandemic must anchor the sea of staggering statistics. Individual stories of lives taken, businesses shuttered, jobs lost, schools closed, and dreams fractured must inform all our strategies for bringing this devastating crisis under control.

This catastrophe has unfolded despite the United States' enormous wealth and unparalleled medical

and scientific capacity. Much like the patchwork U.S. health system – the most expensive on the planet – the pandemic response has been fragmented and deeply flawed. With new variants arising worldwide, bringing the epidemic under control requires strong and capable leadership, with competent execution of sound policies, backed by significant investments.

The World Health Organization Independent Panel on Pandemic Preparedness and Response (IPPR) invited the University of California, San Francisco Institute for Global Health Sciences to develop a case study on the US response to the COVID-19 pandemic. A multi-disciplinary team analyzed and synthesized the work of academics, journalists, non-profit organizations, national, state and local government agencies, and private industry, studying hundreds of academic and media articles, government reports, press releases, blogs, and websites. The team also conducted 23 key stakeholder interviews to ensure a diversity of viewpoints.

This report assesses the U.S. experience one year into the still unfolding epidemic, with the aim of supporting a smarter, faster response to this pandemic, and to the next one, which will surely come.

The devastating impact of COVID-19 on all countries, and the universal commitment to never let this happen again, provides a shared purpose and agenda for transformational change in global collective action. The new U.S. administration has a once in a generation opportunity to seize this moment and work with other countries to create a new era of global health security.

The table below highlights key conclusions and recommendations. More detail on each of these is provided in the body of the report.

*February 22, 2021

Recommendations

Response: For COVID-19

- Effective collaboration between federal, state and local levels, with clearly defined roles and responsibilities.
- Fully staffed National Security Council Directorate for Global Health Security and Biodefense.

- Substantial additional federal monies for pandemic control, including for widespread community surveillance, rapid antigen testing, supported isolation and quarantine, genomic surveillance, and vaccine roll-out.
- Robust testing infrastructure to scale-up public health surveillance. Consider public-private testing consortium modeled on Canada's CDL Rapid Screening Consortium.
- Expanded mask mandates and public education to promote importance of mask wearing.
- Investments in safe reopening of schools and childcare facilities, including federal funding for infrastructure improvements, and for rapid testing and priority vaccination of teachers and staff.
- Investments in supported isolation and quarantine programs, which provide financial and social support to those who are infected or have been in contact with an infected person. Include options for conditional cash transfers, paid institutional isolation, and direct economic relief for workers lacking employment protections.

Preparedness: For the Next One

- Legislation granting emergency powers and funding to mobilize a rapid, coordinated, federally-led response during public health emergencies.
- An apolitical architecture for key public health institutions such as the Centers for Disease Control and Prevention and the Food and Drug Administration. Consider Federal Reserve model.
- Public Health Infrastructure Fund to modernize information technology infrastructure for coordinated operational response during public health emergencies.
- Investments in public health capacity to develop and deploy basic public health measures at scale.
- Public messaging campaign to prepare American people for the next pandemic. Public education on need for emergency powers, potential loss of individual freedoms, and importance of compliance during public health emergencies.

Conclusion #1

The United States lacked effective political leadership in its COVID-19 response at the federal level. Leadership at sub-national levels was highly variable.

Conclusion #2

The U.S. failed to act early and decisively in combating the virus. Critical delays and poorly executed basic public health interventions, compounded by chronic underinvestment in public health, were key contributors to the staggering number of cases and deaths.

The underinvestment in public health continued in 2020 with only 1.6% of Congressional emergency appropriations targeted to public health agencies for epidemic control.

Recommendations

Response: For COVID-19

Preparedness: For the Next One

Conclusion #3

Immigrant, Black, Latinx, American Indian/Alaska Native populations, and those living in poverty, have suffered disproportionately from the COVID-19 pandemic.

Conclusion #4

The structure of the U.S. health system is fundamentally ill-suited to mounting an effective, coordinated response to a pandemic.

Conclusion #5

Hospitals in the U.S. were unprepared to cope with the high influx of COVID-19 patients.

- Investments in targeted programs to protect hardest hit groups including communities of color, and low-income, incarcerated, institutionalized, homeless, and immigrant communities.
- Community partnerships for culturally competent public health messaging on testing, vaccination, and compliance with public health orders such as mask wearing and social distancing.
- Testing and Treatment Safe Havens for undocumented workers. Free testing, treatment, and vaccination regardless of immigration status.
- Required state reporting of public health interventions by racial and ethnic group.
- Flexible rules for public coverage of COVID-19 related interventions including testing, treatment, and short and long-term care for post-COVID-19 disability. Guaranteed financial protection against medical impoverishment for those affected.
- Increased federal premium tax credit or direct subsidies to ensure continuity of health coverage for unemployed or under-employed, who are ineligible for Medicaid.
- Federal emergency subsidies for federally qualified health centers and under-resourced hospitals in rural areas.
- Significant investments to flatten the curve of racial and ethnic disparities in health. This includes access to testing facilities, healthcare coverage and access, worker protections and sick leave benefits, and an expanded social safety net for community resilience.
- Enhanced federal incentives for Medicaid expansion in the 12 states that have not done so already, with requirements to address chronic coverage gaps faced by millions.
- Commitment, funding and action to ensure universal health coverage for everyone.
- Well stocked and expanded Strategic National Stockpile to cope with outbreaks of novel pathogens.
- Investments in strengthened domestic supply chains for critical products.
- Early use of Defense Production Act during public health emergencies.
- Disaster contingency planning for worst-case novel pathogens required for accreditation of hospitals and health facilities.

Recommendations

Response: For COVID-19

- Coordinated and well-funded vaccine distribution program.
- Investments in vaccine equity including health promotion campaigns led by community leaders to allay fears and overcome high levels of vaccine hesitancy among some communities.
- Incentives to vaccine manufacturers to develop improved, cheaper, and easier to administer vaccines for COVID-19.

- Targeted relief for small businesses and those experiencing financial hardship.
- Federal support to state and local governments for continued employment of teachers, public health professionals, police, corrections officers, and other state and local government employees.

- Investments and active participation in global immunologic equity, including support of COVAX, and other initiatives to develop and deploy new therapeutics and diagnostics for low and lower-middle income countries.

Preparedness: For the Next One

- Federal support of public-private partnerships to develop universal influenza and coronavirus vaccines and therapeutics.
- Re-engineered processes for faster approval of new vaccines and therapeutics while safeguarding the quality of approved products.

- Clear agenda and funding for strengthened social safety net.
- Reduced variability among states and among ethnic groups in access to basic health and social services.

- Active participation and investment to create a robust global health architecture for pandemic preparedness and response.
- Funding for a multi-disciplinary One Health approach, including bio-surveillance at the human-animal interface.

Conclusion #6

U.S. commitment to vaccine development has been a defining success. Slow initial rollout and the absence of a coordinated national vaccination strategy has threatened to overshadow this singular achievement.

Conclusion #7

Record levels of federal spending to support families and businesses have been effective in protecting many Americans from serious economic shocks. However, more must be done to ensure continued recovery.

Conclusion #8

The U.S. will not be safe until all countries are safe. Pandemics represent a global security threat that requires commitment to global immunologic equity.

To prevent the scale of suffering inflicted by this pandemic, the world needs a strengthened global architecture for pandemic preparedness and response.

Chapter 1: Introduction and Epidemiology

Sarah* called the urgent care pediatrician in tears. Her two-year-old son, Eddie had been diagnosed with COVID-19 during an emergency department visit the previous day. She simply couldn't get his fever down and he wouldn't drink. Sarah, a Latina waitress earning a minimum wage, has no paid sick leave or employment protections. She was exposed to COVID-19 by a coworker who could not afford to isolate and came to work infected. Sarah also became ill, along with many of her coworkers. Unable to isolate from her large family, the virus spread rapidly through her household of eleven,

including her three children, cousin, elderly parents, and her sister's family. Her cousin, aged 34, was now in the Intensive Care Unit with severe COVID-19 pneumonia. Her elderly mother with heart disease had started coughing. She sobbed questions over the phone: Would Eddie recover? Would her cousin live? Would her mother die from a virus she had brought home? Who would bring them groceries or pick-up Eddie's medicine if she isolated? Her husband, the only person in the household without symptoms, knew he should quarantine but couldn't because they needed his paycheck to survive.

The Context

Sarah's story is tragically common in the United States. Despite being the wealthiest country in the world, the U.S. lacks a basic social safety net, compounding the suffering reaped by the COVID-19 pandemic. While this report focuses on an assessment of the U.S. national response to the virus, the story of COVID-19 is fundamentally about individuals, families and communities. The human impact of the pandemic must anchor the sea of staggering statistics. Individual stories of lives taken, businesses shuttered, jobs lost, schools closed, and dreams fractured must inform all our strategies for bringing this devastating crisis under control.

The story of COVID-19 in the United States is one of daunting scale. The U.S. epidemic dwarfs that of any other country. At the time of writing, the U.S. reports over 28 million cases and 500,000 deaths, accounting for 25% of global cases and 20% of global deaths, despite comprising only 4% of the world's population.^{1,2,3} A recent study shows that average U.S. life expectancy at birth is expected to have dropped by a full year in 2020.⁴

The story is also one of great inequity. The pandemic has laid bare existing socioeconomic, health and access disparities, with Black, American Indians and Alaska Natives,[†] and Latinx Americans dying at over 2.6 times the rate of White Americans^{‡,5,6} when adjusted for age.⁷ Projections show that in 2020, life expectancy at birth for Black Americans will have dropped by over two years, while Latinx Americans will have suffered a drop of over three years.⁴ Life expectancy for Black males (74.9 years) was already a full 3.6 years less than that of White males (78.5 years) in mid 2020.⁴ While experiencing lower mortality from the virus itself, the economic and social consequences have also been particularly severe for women, notably for women of color and immigrants like Sarah.^{8,9,10}

This catastrophe has unfolded despite the United States' unparalleled medical and scientific capacity. Much like the patchwork U.S. health system – the most expensive on the planet – the pandemic response has been fragmented and deeply flawed. And with new variants arising worldwide and sluggish initial vaccine deployment, bringing the epidemic under control will

*This is a true story with the names changed.

†This report uses the term American Indian and Alaska Native (AI/AN) in keeping with the conventions through which AI/AN communities refer to themselves.

‡For the purposes of this report we have capitalized the term 'White' in concordance with recommendations from the Center for the Study of Social Policy and the National Association of Black Journalists.

require transformational leadership, with swift and competent execution of sound policies, backed by significant investments.

This Report

This case study of the U.S. response to the COVID-19 pandemic shines a light on lessons learned and provides recommendations for immediate action and longer-term preparedness to the World Health Organization Independent Panel on Pandemic Preparedness and Response (IPPR).

The report analyzes and synthesizes the work of academics, journalists, non-profit organizations, national, state and local government agencies, and private industry. A multidisciplinary team, under the leadership of the University of California, San Francisco, Institute for Global Health Sciences, has studied hundreds of academic and media articles, government reports, press releases, blogs and websites. The team also conducted 23 key stakeholder interviews to ensure a diversity of viewpoints. The conclusions and recommendations included in this report have been reviewed by a group of external experts.

The report's aim is to provide an objective analysis and build a comprehensive narrative that can be used to support a smarter, faster, more effective response, both for this pandemic and the next one that will surely come.

In this chapter, we lay a foundation for discussing the U.S. response to COVID-19 by highlighting key events in the U.S. epidemic and providing an overview of its epidemiology. Chapter 2 discusses our assessment framework. The main body of the report assesses the U.S. response in the key domains of this framework; the final chapter provides conclusions and recommendations; a Post Script at the end of the report highlights key actions by the Biden Administration taken since January 20, 2021.

How Did the U.S. Get Here?

“There are instances in history where humanity has really moved mountains to defeat infectious diseases. It’s appalling that we in the U.S. have not summoned that energy around COVID-19.”

– *Caitlin Rivers, epidemiologist, Johns Hopkins Center for Health Security*¹¹

As the timeline below shows, there were multiple lost opportunities for the U.S. to recognize the potential

seriousness of the virus, and to implement basic public health containment measures between January and March 2020. The consistent minimization of the unfolding catastrophe, with false and misleading messages from leaders, led to complacency and confusion, which allowed the virus to spread unchecked. A notable success, however, was Operation Warp Speed, which led to the development of effective vaccines in record time. The key events in this timeline are discussed in greater detail in the chapters of this report.

The Story in Numbers

The U.S. epidemic is actually a composite of hundreds of different epidemics in towns, counties and cities throughout the United States. In this section we examine cases and deaths nationally and sub-nationally, covering the period of January 2020 to January 2021.

The U.S. Compared to Europe and East Asia

We compare U.S. cases and deaths to two major economic blocks using the University of Oxford dataset: the European Union (EU)* and the Asian Regional Comprehensive Economic Partnership minus China (RCEP14).^{†3} By the end of January 2021, the United States reported over 20 million cases, 79% higher than the EU when adjusted for population (Figure 1A).³ Due to limited testing availability, it is estimated that actual cases could be up to 20 times higher than those reported.¹² Strikingly, cumulative U.S. cases per million people were almost 27 fold those in the RCEP14, which has clearly been the world leader in containment of the virus.³

By February 22, 2021, 500,000 Americans had died from COVID-19.¹³ In the month of January alone, one American was dying every 28 seconds.¹⁴

Higher case fatality ratios in certain European countries contributed to the EU and U.S. having similar peaks in death rates in winter 2020–2021, but because of its continuously high mortality rate throughout the year, the U.S. (1354 deaths/million) had a cumulative mortality rate 28% higher than the EU (1058 deaths/million). The cumulative U.S. mortality rate was a remarkable 22 fold that of the RCEP14 (60 deaths/million) (Figure 1B).³

*European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, U.K. (no longer part of the EU as of 12/31/2020)

†Regional Comprehensive Economic Partnership: Australia, Brunei, Cambodia, Indonesia, Japan, Korea, Laos, Malaysia, Myanmar, New Zealand, Thailand, the Philippines, Singapore and Vietnam. We exclude China due to population size.

Timeline of Key Events

- **12/31/19** World Health Organization is alerted to reports of unusual cases of pneumonia linked to Huanan Seafood Wholesale Market in Hubei Province and requests verification from the Chinese government of an emerging outbreak.^{15,16} It is suspected that undetected infections were circulating in Hubei, France, and Italy as early as October, 2019.¹⁷
- **1/3/20** CDC China Director calls U.S. CDC Director for the first time about novel viral outbreak.¹⁸
- **1/9/20** WHO reports the Chinese Government has determined the outbreak is caused by a novel coronavirus.¹⁹
- **1/11/20** Chinese authorities share genetic sequence of SARS-CoV-2.¹⁹ First reported COVID-19 death occurs in Wuhan.²⁰
- **1/13/20** WHO publishes protocol for PCR assay developed by partner laboratory.¹⁹
- **1/21/20** Washington State confirms first case of novel coronavirus in traveler from China, who had arrived in the U.S. on January 15.¹⁶
- **1/23/20** China issues lockdown of Hubei Province but virus is already spreading worldwide.²¹
- **1/29/20** White House Coronavirus Task Force is formed.²²
- **1/30/20** WHO announces a Public Health Emergency of International Concern.¹⁹
- **1/31/20** Trump administration announces travel ban on non-U.S. citizens who have been to China in the past 14 days.²³
- **2/4/20** FDA grants emergency authorization of proprietary CDC test kits, which are not based on WHO published assay.²⁴
- **2/5/20** CDC begins shipping test kits to state public health departments. These kits are later found to be contaminated.^{24,25}
- **2/6/20** **First U.S. Death Confirmed**
- **2/26/20** Vice President Pence is appointed to lead White House COVID-19 Task Force. President Trump announces, "This is a flu. This is like a flu."^{26,27} CDC confirms community transmission in U.S.²⁸
- **2/27/20** White House takes control of all official government press on COVID-19, sidelining CDC and other public health agencies.²⁹ CDC relaxes guidelines for testing and directs state public health labs to use test kits without contaminated component.³⁰
- **2/29/20** President Trump begins leading press briefings in which he minimizes threat of the virus. He repeatedly praises the U.S. response assuring the public that "No, I'm not concerned at all. No, I'm not. No, we've done a great job."³¹
- **3/1/20** First case of COVID-19 is identified in New York, starting a deadly surge on the East Coast. Later studies show the virus has been circulating since January in the U.S., with first suspected cases of community transmission dating from February.^{32,33}
- **3/11/20** WHO announces COVID-19 is officially a pandemic.¹⁹ U.S. issues travel ban for expanded list of countries. All travelers from these countries are funneled to specific airports and screened on arrival.³⁴
- **3/13/20** President Trump declares a national emergency.³⁵
- **3/16/20** Trump administration announces 15 day "Social Distancing" guidelines with non-essential business closures and stay-at-home orders (also called lockdowns). This is later extended to 45 days.³⁶
- **3/17/20** COVID-19 is identified in all 50 states.³⁷
- **3/26/20** **1,000 U.S. Deaths Confirmed**
- **3/27/20** \$2.2trn Coronavirus Aid, Relief, and Economic Security Act (CARES) is passed as stimulus relief for businesses and families.^{38,39}

● **4/24/20** **50,000 U.S. Deaths Confirmed**

● **5/15/20** Operation Warp Speed is launched to begin development of vaccines for SARS-CoV-2.⁴⁰

● **5/27/20** **100,000 U.S. Deaths Confirmed**

● **7/9/20** WHO announces COVID-19 can be airborne after more than 200 scientists sign a letter urging the organization to revise its recommendations.^{41,42}

● **7/15/20** The White House requires all hospitals to bypass CDC and send COVID-19 data to Health and Human Services (HHS).⁴³

● **7/22/20** Advance purchase agreements are signed with Pfizer and BioNTech for large supplies of vaccines, contingent on successful Phase 3 trials.^{44,45}

● **8/7/20** Large rally of motorcyclists in Sturgis, North Dakota becomes “superspreader” event.⁴⁶

● **8/25/20** CDC issues guidelines recommending exposed people who are asymptomatic do not need testing. CDC's scientific review process later reverses this guidance.^{47,48}

● **9/14/20** U.S. airports are instructed to stop redirecting passengers from certain ‘hotspots’ and to stop screening international travelers.⁴⁹

● **9/22/20** **200,000 U.S. Deaths Confirmed**

● **9/26/20** White House Rose Garden gathering for new Supreme Court justice becomes a superspreader event.⁵⁰

● **10/2/20** President Donald J. Trump tests positive for COVID-19 and receives an array of advanced treatments, including monoclonal antibodies, remdesivir, oxygen and steroids.⁵¹

● **10/5/20** President Trump is discharged from the hospital. In subsequent days, he reassures the American public saying, “Don’t be afraid of COVID”, and “You catch it, you get better, and you’re immune.”^{52,53}

● **10/28/20** White house announces free future COVID-19 vaccines for U.S. citizens.⁵⁴

● **12/11/20** Emergency use authorization is granted for Pfizer-BioNTech vaccine.⁵⁵

● **12/14/20** **300,000 U.S. Deaths Confirmed**

● **12/27/20** Coronavirus Response and Relief Supplemental Appropriations Act authorizing \$900 billion in additional funding, is passed to continue benefits for those affected by lockdowns.⁵⁶

● **12/30/20** B.1.1.7 variant from the U.K. is detected. Other variants are emerging in South Africa and Brazil.⁵⁷

● **1/19/21** **400,000 U.S. Deaths Confirmed**

● **1/20/21** Joe Biden is sworn in as 46th President of the United States.

● **2/22/21** **500,000 U.S. Deaths Confirmed**

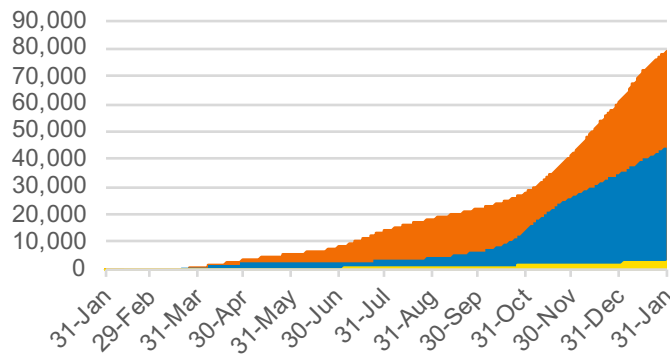
Figure 1C shows the 7-day rolling average for incident cases in the three geographic regions. Following spring surges in both the U.S. and EU, the EU was able to control transmission during the summer months, while the U.S. continued to experience high transmission rates throughout the summer. While both regions suffered major surges in the fall and winter, the U.S. surge was much greater. By contrast, having contained community spread early in the pandemic, the RCEP14 had consistently low case incidence rates throughout the year.³

As Figures 1A–D illustrates, while the U.S. performed somewhat worse than the EU in 2020, it performed

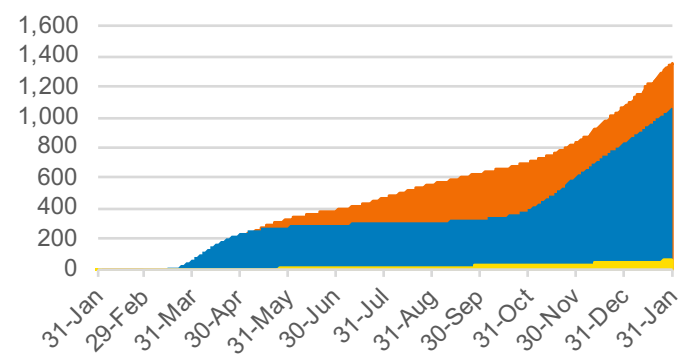
dramatically worse than the RCEP14. This is remarkable given the extreme diversity of RCEP14 countries, from Laos to Japan, and Australia to the Philippines. As discussed in this report, these large differences do not stem from the fundamental biology of the virus or its human victims, but from the critical nexus of leadership, policy, execution, and compliance.⁵⁸ These differences in performance are not merely of scientific interest – they translate into hundreds of thousands of human lives saved or lost. If the U.S. had the same cumulative deaths/million as the RCEP14 over the last year, a staggering 428,000 American lives would have been saved by the end of January 2021.

Figure 1. Regional analysis United States, European Union, RCEP 14³

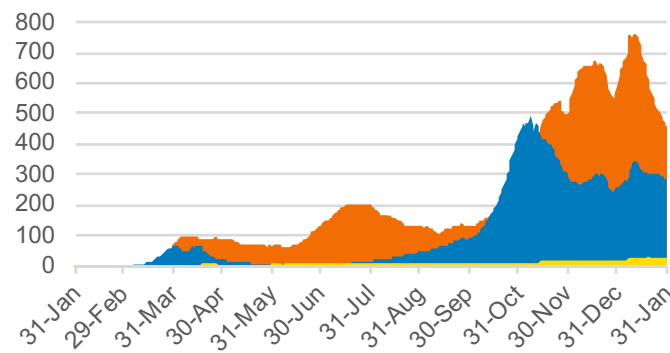
A: Cumulative COVID-19 cases per million



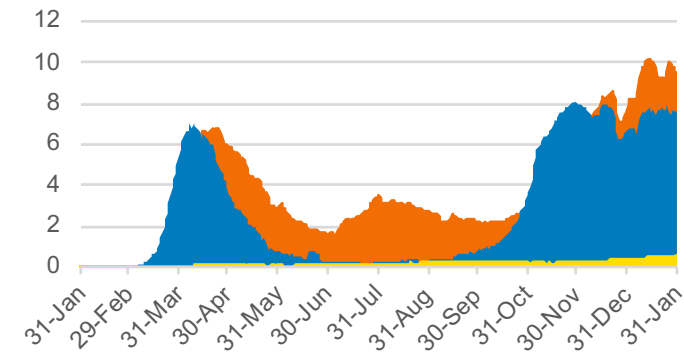
B: Cumulative COVID-19 deaths per million



C: Daily new COVID-19 cases per million, rolling 7-day average



D: Daily new COVID-19 deaths per million, rolling 7-day average



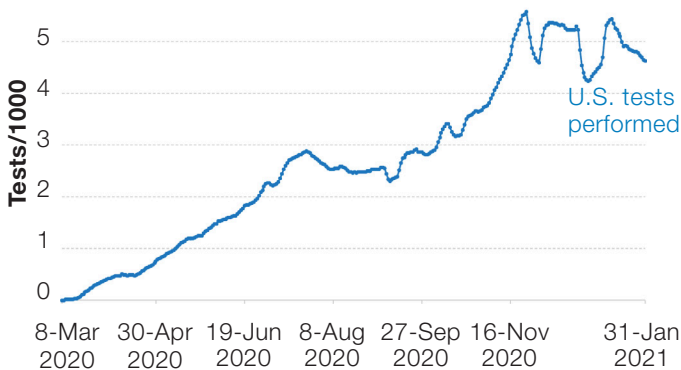
United States European Union RCEP 14

Testing in the United States

Testing is important both to understand the scale of the epidemic and to prevent community spread through isolation and quarantine. Testing roll-out did not begin in earnest in the U.S. until mid-March, almost two months after the virus had arrived in the country.

U.S. testing policy continues to prioritize symptomatic patients over widespread community testing to identify and isolate asymptomatic cases. There are no federal standards for reporting testing data, with each state determining which types of tests to report (PCR, antigen etc.). States have also paused reporting at various points. With these caveats, [Figure 2](#) shows the ramp-up of testing in the U.S., with rates growing slowly but steadily from March 2020 and notable peaks in December and January.

Figure 2. Daily COVID-19 tests per thousand people in the U.S., rolling 7-day average⁵⁹



Source: Daily COVID-19 Tests. Reprinted from [Ourworldindata.org](https://ourworldindata.org), by M. Roser et al. 2021. Retrieved from <https://ourworldindata.org/coronavirus>. Copyright 2021 by Our World In Data. Reprinted with permission.

Comparing States

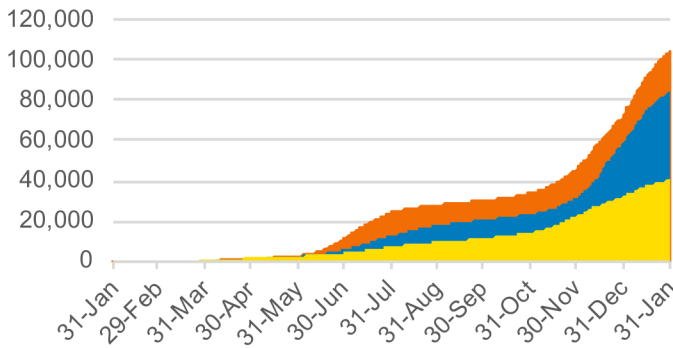
There are significant variations among states in the U.S. in case and death rates. Without federal guidance, states, counties, and cities pursued widely divergent approaches, creating a patchwork of policies and performance. Decisions on when and how to enact public health interventions such as shelter-in-place orders or “lockdowns,” as they were known, were left to county public health departments, resulting in haphazard implementation and differing orders, even within the same state.

We use the Johns Hopkins University dataset to compare differences in case and death rates in three states that are representative of a broad range of performance. Cases rates are impacted by testing policies in each state so interstate comparisons must be viewed with caution. In addition, as with national data, real case numbers may be more than 10 times higher than reported. [Figure 3A](#) shows cumulative case rates in Arizona, California, and Washington.¹

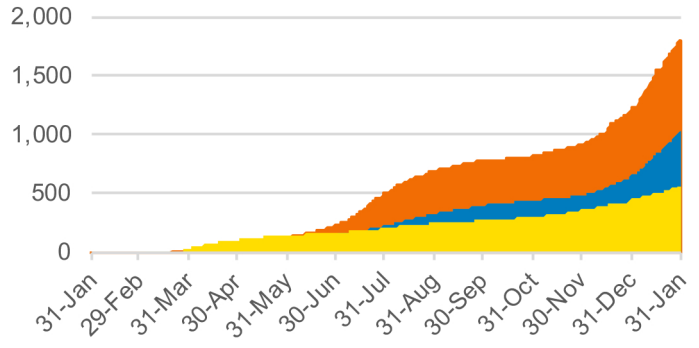
Total cases/million people in Arizona, one of the worst performing states were 2.5 times higher than those in Washington, one of the best performing states. The cumulative death rate in Arizona was more than triple that of Washington ([Figure 3B](#)). One cause of this disparity may be the different racial and ethnic mix in these two states. Whereas Arizona has a population that is 42% Black, Latinx or American Indian, in Washington State less than 20% of people fall into one of these racial or ethnic groups.^{60,61} Perhaps a fairer comparison would be between Arizona and California, which have more similar racial and ethnic make-ups.⁶² Yet, Arizona’s mortality rate was 75% higher than that of California.¹

Figure 3. State analysis for Arizona, California, and Washington¹

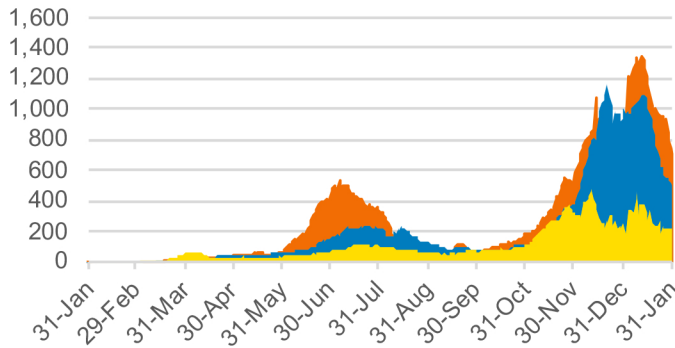
A: Cumulative COVID-19 cases per million



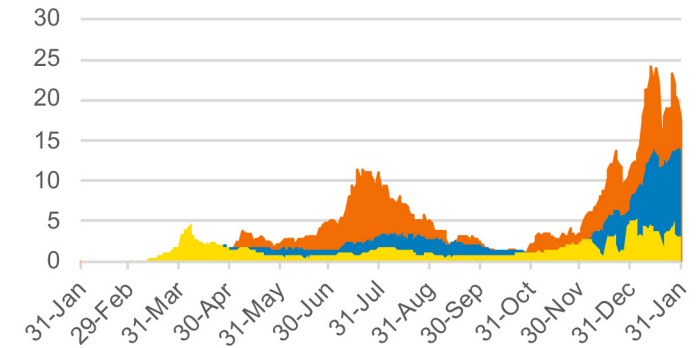
B: Cumulative COVID-19 deaths per million



C: Daily new COVID-19 cases per million, rolling 7-day average



D: Daily new COVID-19 deaths per million, rolling 7-day average



Arizona California Washington

While California and Washington managed to slow transmission during the summer months, Arizona experienced a summer peak followed by an even higher winter peak, which rose to more than 1300 cases/million per day (Figure 3C).¹

These patterns indicate starkly different outcomes between states by the end of 2020, translating into many lives saved or lost, and pointing to major differences in the performance of state governments and agencies.

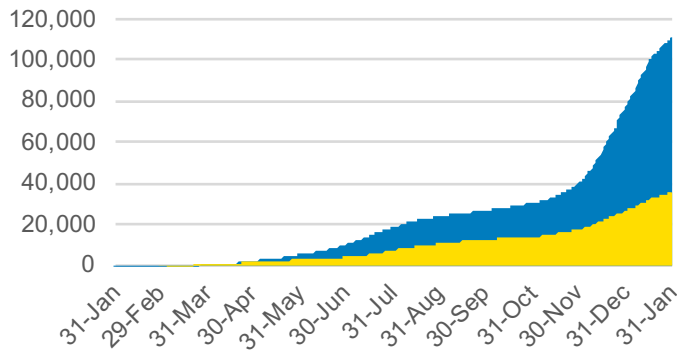
Total COVID-19 mortality rates between the best performing state, Hawaii, and the worst performing state, North Dakota, show more than a 6.5 fold difference. It is beyond the scope of this report to analyze the causes of these differences.

Comparing Counties

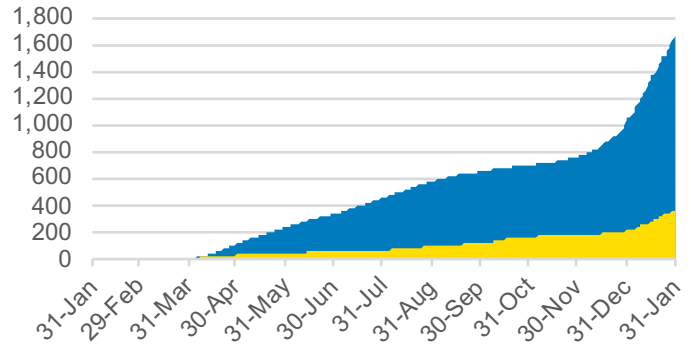
The differences among counties are even more notable. We compare two well-known counties in California, Los Angeles and San Francisco (Figure 4).¹ These counties are illustrative, rather than representative, of all U.S. counties.

Figure 4. County analysis for San Francisco and Los Angeles, California¹

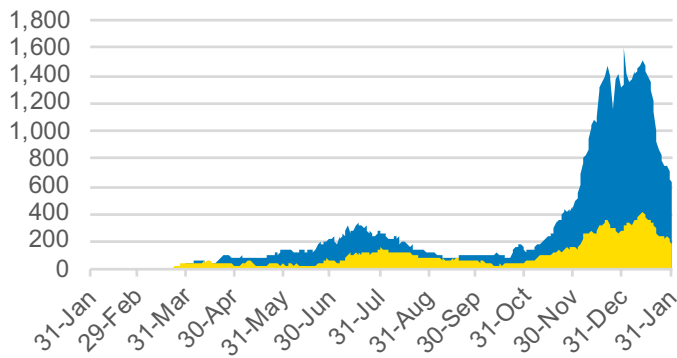
A: Cumulative COVID-19 cases per million



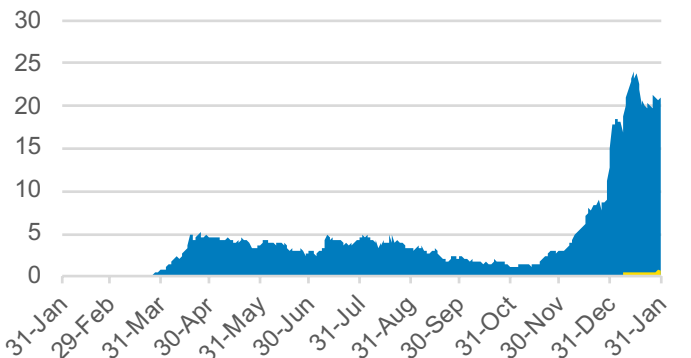
B: Cumulative COVID-19 deaths per million



C: Daily new COVID-19 cases per million, rolling 7-day average



D: Daily new COVID-19 deaths per million, rolling 7-day average



Los Angeles
 San Francisco

Despite identical state public health orders, compliance, enforcement and local policies differed markedly in these two counties. San Francisco managed to control its epidemic, with a cumulative case rate of approximately 36,000/million and a low death rate of 368/million (Figure 4A). By contrast, case and death rates in Los Angeles were 3.1 and 4.5 times higher, respectively, at the end of January 2021 (Figure 4A & B).

These large differences are also clearly reflected in daily case and death rates (Figure 4C & D). Daily case rates in Los Angeles first peaked in June and then exploded in the winter months, despite warmer weather conditions. Daily death rates in San Francisco were consistently and dramatically lower than those in Los Angeles, reflecting a combination of lower transmission and lower case fatality ratios. Some of this variation may be explained by differences in racial and ethnic demographics, with a population that is almost 50%

Latinx in Los Angeles compared to 15% in San Francisco.^{63,64} It is beyond the scope of this report to analyze the causes of these differences.

Inequities in Cases and Deaths

“We in California have to face the fact that our Latino communities, overrepresented among frontline workers, have never seen a decline in cases and deaths the way other groups have. That means there has always been a rip-roaring brush fire in those communities.”⁶⁵

– Dr. Kirsten Bibbins-Domingo, Director, Epidemiology and Biostatistics, University of California, San Francisco

COVID-19 has exploited existing disparities in health outcomes in people of color, immigrants and low-income individuals. These historical disparities are multifactorial and rooted in systemic racism, including lower education attainment, fewer employment opportunities, and unequal access to health coverage and medical care.^{66,67,68} Almost a quarter of Black and Latinx Americans live in multigenerational homes with crowded conditions efficiently fueling viral transmission.⁶⁹ Poverty and occupational hazards are also more pronounced in these communities, with many employed at low paying essential jobs, such as factory work or grocery stores, placing them at higher risk of infection. Lacking employment benefits and protections, isolating and quarantining is often financially infeasible. For example, only 46% of Latinx workers have employer paid sick leave, compared to 67% of White workers.^{70,71} In addition, disadvantaged communities experience higher rates of comorbidities, placing them at additional risk for severe COVID-19.^{72,73}

Despite higher demand for testing in minority communities due to higher infection rates, one study found that these communities tended to live in “testing deserts.”⁷⁴ Zip codes where the population is 75% or more White, had an average of one test site per 14,500 people; whereas zip codes with 75% of residents who are people of color, had one test site per 23,300 people.⁷⁴

When adjusted for age, differences in outcomes for Black, Latinx, and American Indian and Alaska Native communities are pronounced (Table 1). Members of these communities were 3.7 to 4.1 times as likely to be hospitalized as White Americans, and between 2.6 to 2.8 times more likely to die from COVID-19.⁷⁵ With a history of disenfranchisement, American Indian and Alaska Native communities in particular have experienced poor outcomes (Box 1).⁷⁵

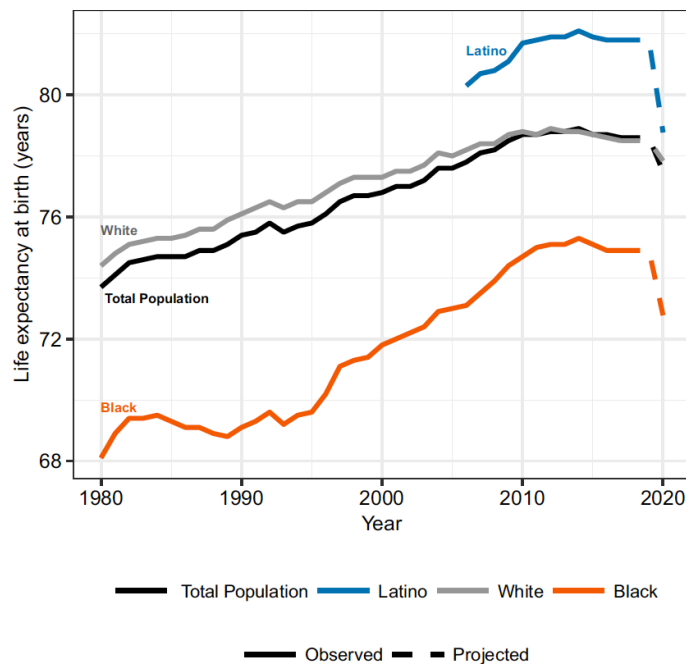
Table 1. Age adjusted COVID-19 cases, hospitalizations, and deaths, by race/ethnicity, January 2021⁷

Rate ratios compared to White, Non-Hispanic persons	American Indian or Alaska Native, Non-Hispanic	Hispanic or Latino	Black or African American, Non-Hispanic
Cases	1.8 x	1.7 x	1.4 x
Hospitalizations	4 x	4.1 x	3.7 x
Death	2.6 x	2.8 x	2.8 x

Source: *Hospitalizations and Death by Race/Ethnicity*. Adapted from CDC.gov by the Centers for Disease Control and Prevention. Retrieved from <https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html>. Copyright 2021 by the CDC. Reprinted with permission.

Modeling suggests that the long-term consequences of this epidemic will be devastating for disadvantaged communities, widening gaps in life expectancy.^{4,76} A recent study estimates that reductions in life expectancy in 2020 in Black and Latinx populations are likely up to four times those in White populations (Figure 5).⁴

Figure 5. Projected trends in life expectancy by population⁴



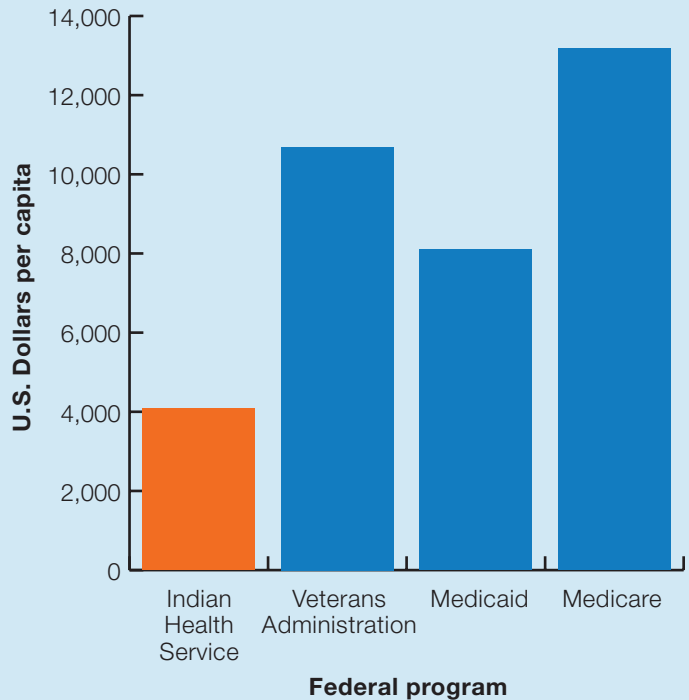
Source: *Projected trends in life expectancy by population*. Reprinted from *Reductions in 2020 US life expectancy due to COVID-19 and the disproportionate impact on the Black and Latino populations by T Andrasfay, 2021, Proceedings of the National Academy of Sciences of the United States of America, 118 (5) e2014746118*. Copyright 2021 by PNAS. Reprinted with permission.

Box 1: COVID-19 in American Indian and Alaska Native Communities

American Indians and Alaska Natives (AI/AN) have suffered greatly in this pandemic.⁷⁷ Though leadership of many tribal communities was strong and proactive, baseline disparities in healthcare embedded in histories of neglect, erasure, under counting, and structural racism, have contributed to poor outcomes.^{78,79,80} American Indians and Alaska Natives, like many historically disadvantaged groups, often work in essential jobs, and live in shared housing, placing them at high risk for infection.^{81,82} Some American Indian reservations lack basic necessities like running water, particularly shocking in the wealthiest country in the world.⁸³ National data also likely undercount AI/AN cases due to limited availability of testing, and exclusion or misclassification of ethnicity in national data reporting.⁸²

Healthcare in tribal territories is provided by the Indian Health Service (IHS), a branch of the U.S. government. The IHS, which runs its own hospitals and clinics, receives only 38% of the per capita funding as the Veterans Affairs Administration, which also operates its own health facilities (Figure 6).⁸⁴

Figure 6. Public health expenditures per capita, 2017⁸⁴



Source: *Public Health Expenditures per capita*. Reprinted from *Spending Levels and Characteristics of IHS and Three Other Federal Health Care Programs* by the Indian Health Services, 2020, retrieved from <https://www.gao.gov/products/gao-19-74r>. Copyright 2020 by the Government Accountability Office. Reprinted with permission.

The Bottom Line

On the international stage, the U.S. has performed poorly in comparison to the European Union, and disastrously compared to East Asia and Australasia. Within the U.S., some states and counties have performed notably better than others, indicating that poor national performance was not inevitable. If all states and counties had been as effective at containing the pandemic as Washington (563 deaths/million) or San Francisco (368 deaths/million), the U.S. would have performed much better than the EU average (1058

deaths/million), and at the same level as some of the best performing European countries.

The U.S. has failed its most vulnerable populations. Without exception, communities of color and historically disadvantaged people have suffered a far greater burden of sickness, death, and economic and social hardship. On many fronts, the vulnerabilities and inequities in U.S. society have been exposed. Perhaps this will be a wake-up call for the country to address these long-standing disparities.

Chapter 2: Framework for Assessing the U.S. Response

Historically, epidemic and pandemic preparedness and response frameworks have aimed to provide nations with opportunities to evaluate response readiness. These measurement tools assess national and global health security capacity to minimize health shocks from biological threats when they occur. Pandemic influenza has been a central focus of many global assessment efforts; though recent infectious diseases, such as SARS (2002), MERS (2012), Ebola virus disease (2014, 2018), and Zika virus (2015), have prompted revisions to these frameworks.

The main global instrument for measuring pandemic preparedness is the International Health Regulations (IHR) 2005.⁸⁵ The IHR provides a legal framework that defines responsibilities and obligations of State Parties during public health events. It also includes a Monitoring and Evaluation Framework that consists of two measurement tools: State Parties Self-Assessment Annual Reporting (SPAR) and Joint External Evaluations.^{86,87} While the IHR is used by 196 countries, numerous other frameworks exist, including the Global Health Security Agenda 2024 Framework, and the Global Health Security Index.^{88,89}

Multiple high-level reviews by independent panels and commissions have followed recent epidemics. Notable examples, each with their own assessment methodologies, include the WHO Ebola Interim Assessment Panel,^{90,91} the Harvard-LSHTM Independent Panel on the Global Response to Ebola,⁹² the National Academy of Medicine Commission on a Global Health Risk Framework for the Future,⁹³ the UN Secretary-General High-Level Panel on the Global Response to Health Crises,⁹⁴ and the Global Preparedness Monitoring Board 2020 assessment.^{95,96}

Our case study framework blends criteria from the above assessment frameworks to assess the U.S. response to COVID-19 (Table 2). To provide depth to our analyses, we have conducted extensive interviews with 23 external experts. We have also reviewed IPPR documents and press releases, and addressed topics specifically suggested by the IPPR. A group of independent reviewers provided comments on our main conclusions and recommendations.

Table 2. A systems framework for assessment of the United States COVID-19 response

Category	Description
Leadership	Political leadership at all levels. Attributes assessed: decision-making; accountability; and constructive influence on public opinion and behavior.
Economics and Financing	Economic impact and special appropriations for income support and virus control, equitable and strategic distribution of funds. Attributes assessed: resources for COVID-19; federal allocations; and safety net mechanisms.
Public Health Measures	Activities to decrease viral transmission and safeguard health. Attributes assessed: testing strategy and implementation; contact tracing, masking, quarantine, and isolation; stay-at-home orders or sectoral closures and bans on large gatherings; surveillance systems; and border control.
Communication, Trust and Engagement	Activities to build confidence in the integrity and reliability of institutions. Attributes assessed: public trust in leaders and government agencies; communication accuracy, clarity, reliability, consistency, transparency, empathy; community engagement.
Health System Resilience	Health services delivery. Attributes assessed: hospital and primary care capacity; access to COVID-19 and core health services; resources of healthcare system; equity; and vaccine deployment.
Scientific Innovation & Research	Innovation to develop new knowledge and technologies, expand existing knowledge and technologies. Attributes assessed: vaccine development; drug development and clinical trials; diagnostic test development; scientific collaboration and innovation; clinical protocol development and training; and pandemic related global health research.

Chapter 3: Leadership

Countries that successfully controlled cases and deaths due to SARS-CoV-2 responded swiftly, acted decisively, created workable strategies, and executed well on these strategies.^{97,98,99,100,101} They did this in an environment of considerable uncertainty where little was known about this novel pathogen. These countries adopted approaches that assumed the worst-case scenario: that the virus had already been spreading in their countries undetected; that transmission from asymptomatic and pre-symptomatic cases would be significant; and that the virus would cause greater morbidity and mortality than initially apparent. Successful leaders appreciated that, as in most emergencies, the risk of doing too little is considerably greater than the risk of doing too much. Rapid, bold and decisive action, even if based on imperfect evidence, is crucial to effectively respond to an emerging public health crisis.

COVID-19 presented a national security threat which successful leaders communicated clearly to their people, seeking the public's support for measures that could cause considerable disruption to millions of lives and livelihoods. They recognized that to overstate the threat, and later be accused of being alarmist, is preferable to the opposite. Leadership was an essential element for success in managing the COVID-19 pandemic – arguably the most important element – and one that was glaringly absent in the U.S. response.

In this chapter we examine U.S. leadership in two arenas: domestic leadership, and the U.S. role in global leadership.

Domestic Leadership

Structures and Safeguards

By some measures the United States was well prepared to respond to a global pandemic. It ranked first for pandemic preparedness in the Global Health Security Index in 2019 and scored highly on International Health Regulation (IHR) readiness assessments.^{102,103}

Recognizing the threat posed by emerging infections, previous U.S. administrations had created a playbook for national public health emergencies: the National Security Council (NSC) Playbook for Early Response to High Consequence Emerging Infectious Disease

Threats and Biological Incidents (Pandemic Playbook). Unfortunately, this playbook was not effectively utilized for COVID-19, and the office that housed it, the NSC Global Health Unit, had been disbanded in 2018.¹⁰⁴

In mid-2019, the Department of Health and Human Services (HHS) partnered with key federal and state agencies in a simulation exercise based on a novel respiratory pathogen originating in China. Dubbed Crimson Contagion, the simulation raised concerns about the ability of the U.S. to respond to a pandemic. It unearthed large gaps in coordination across agencies and problems with domestic capacity to manufacture necessary vaccines, therapeutics, and personal protective equipment (PPE). An After-Action report highlighted the steps needed to respond effectively to a future pandemic.¹⁰⁵ As of January 2020, when the virus was first detected in the U.S., none of these steps had been taken.¹⁰⁶

A national response requires coordination of resources, personnel, expertise, and operational capabilities across multiple government agencies. In the U.S. these agencies rely on different data streams and information systems, and function under the leadership of ever-changing political appointees.¹⁰⁷ Unlike permanent secretaries in parliamentary democracies who are members of the civil service, leaders of the key agencies involved in pandemic response are part of the roughly 4,000 political appointments filled by each new administration.¹⁰⁸ What happened at the national level in this pandemic reflects the decisions of these leaders, and actions or inactions of their agencies.

Slow, Flawed and Political

“No, I’m not concerned at all. No, I’m not. No, we’ve done a great job.”³¹

– *President Donald J. Trump, March 7, 2020*

With immense resources at its disposal, the U.S. did not lack qualified or experienced people who knew how to swiftly respond to public health emergencies. What it did lack was an effective and apolitical body that could rapidly coordinate U.S. government agencies to focus on the overarching goal of protecting the American public.

On January 29, 2020, a White House Coronavirus Task Force was created with political appointees at its helm, first the Secretary for HHS and, a month later, the Vice President.²² This sent a clear signal that the Trump administration would lead the COVID-19 response, not public health experts at the Centers for Disease Control and Prevention (CDC).

Despite the need to act quickly, the Task Force did not produce a national plan until March 11, by which time community transmission was well established, and New York was in the midst of a deadly outbreak.¹⁰⁹ Despite evidence from other coronavirus outbreaks (SARS and MERS), the national plan was adapted from an influenza pandemic strategy, which did not account for potential differences in transmission and clinical sequelae of these unique viruses.¹¹⁰ The plan also failed to recognize that the U.S. was well past a viable containment phase and needed to rapidly deploy multi-community mitigation strategies.

The delay in developing a coherent epidemic control strategy was compounded by serious missteps by the CDC (discussed below) in rolling out testing, which allowed the virus to spread, largely undetected, across the U.S. for more than a month.^{109,111}

The opportunity to act early and decisively had been lost. To effectively mitigate spread now would require a large allocation of resources and would entail measures likely to have substantial negative effects on the economy and everyday lives. Yet in late February, the Secretary of HHS, told the Congressional Appropriations Committee that only \$2.5 billion would be sufficient to adequately fund testing, contact tracing, purchasing of PPE, pharmaceutical development, as well as provide support to state and local governments in their COVID-19 responses. Members of Congress suggested that this number was far too low, but they were assured by the administration that this matched the scale of the threat in the U.S.¹¹² Less than a month later, Congress would pass the largest fiscal relief bill in its 230 year history, totaling an unprecedented 11% of U.S. gross domestic product (GDP).^{113,114}

Decision Whiplash

During March and April 2020, the President became communicator-in-chief, leading daily White House briefings on the U.S. epidemic. In these briefings he minimized the threat of the virus, continued to insist the epidemic was under control, and repeatedly praised his administration's response.

On March 16, 2020, in response to surging cases and at the behest of his public health advisors, the President urged the country to follow social distancing recommendations for a period of 15 days.¹⁵ These included discouraging gatherings of more than 10

people, implementing social distancing in restaurants and businesses, and urging people to stay at home if possible.³⁶ Overnight, businesses and schools shut down; over 3 million people lost their jobs in the following week.¹¹⁵ At the end of this period, as cases and hospitalizations continued to surge, the President extended this guidance for another 4 weeks. Then, facing criticism from business leaders, he abruptly changed course and one week later issued a call for the economy to open by April 12 for the Easter holiday, encouraging full churches, which would provide perfect conditions for rapid viral transmission. On April 12, as fatalities doubled every two days, he again reversed course and recommended an extension of social distancing until June 1.^{116,117}

In May, as the U.S. death toll surpassed 100,000, the President declared the "U.S. had met the moment" and its response to the "Chinese virus" was a success.¹¹⁸ This message of a successful response continued throughout 2020, even as U.S. case and death rates became among the highest in the world.

Passing the Buck

"The President said the governors are on their own and they should focus on getting their own tests, and that's exactly what we did."¹¹⁹

– Larry Hogan, Governor of Maryland, April 21, 2020

The federalist system in the U.S. presents complexity for political leaders. Health is a state responsibility, but in times of national emergency, the federal government has powers to assume leadership.^{120,121} The declaration of a public health emergency by the Secretary of HHS on January 31, 2020 provided federal authority and funding to support state and local public health agencies in their response to the virus.^{122,123}

An important role of the federal government is to mobilize and coordinate resources to ensure that states have critical medical equipment and supplies to mount a strong response to a pathogen. It has two mechanisms to do this: the first is the Strategic National Stockpile, to be used to provide medical supplies, medicines, devices, and equipment to states during public health emergencies.¹²⁴ The second is its power to invoke the Defense Production Act, which compels and incentivizes private companies to scale up production of critical products.¹²⁵ A coordinated federal response means working with governors to allocate essential supplies to states based on need.

The Trump administration, however, abdicated this responsibility and passed it to state governors.¹²⁶

The dangers of this approach were quickly apparent in extreme shortages in supplies from reagents and vials for test kits, to PPE to safeguard health workers. Governors were instructed to fend for themselves, leaving states to compete with each other on global markets.¹²⁷ For example, as the U.S. struggled to produce sufficient test kits in late April, Maryland's Republican first lady brokered a deal with her native South Korea to secure 500,000 test kits and had them flown directly to Maryland in "Operation Enduring Freedom."¹¹⁹ Remarkably, the Federal Emergency Management Agency (FEMA) also began competing with states on the global market, confiscating PPE ordered by states, and creating what was dubbed a "war" for medical supplies.¹²⁸ It was not until the end of March, over two months into the U.S. epidemic, that the Defense Production Act was finally invoked.¹²⁹

Without clear federal guidance, states developed individual strategies which, in the midst of a deeply polarized national political environment, seemed to coalesce along partisan lines.^{130,131,132} Some states took a lead in implementing shelter-in-place or 'lock-down' strategies that closed businesses, shut schools, required work from home for non-essential workers, limited travel within states, and constrained individual freedoms such as requiring mask wearing in public. Others adopted a more laissez-faire approach, echoing former President Trump's many assurances that the threat of the virus was limited.¹³³ This led to a haphazard array of subnational policies. While the public discourse should have been laser-focused on the best approach to deal with the COVID-19 national security threat, it instead concentrated on doubts of whether a national security threat even existed or if the virus could be a hoax perpetuated by the liberal mainstream media.^{134,135}

Some governors and tribal leaders did better in protecting their states from the viral threat. For example, President Jonathan Nez of the Navajo Nation created a unified command center to respond to ballooning cases and deaths in the Navajo Nation.¹³⁶ He also implemented strict public health measures, including public mask mandates, daily curfews, testing, weekend lockdowns and widespread evidence-based communication campaigns.^{78,137} These measures helped to stem the steep rise in cases, hospitalizations, and deaths.¹³⁷

Leadership Matters

National emergencies require leaders to communicate clearly, consistently and correctly. There is no doubt that conflicting messages from national leaders, state governors and public health experts, sowed real confusion in the minds of the American people, and left many feeling unclear about how best to protect their families and communities. This report examines critical communications issues in more detail in Chapter six.

Leaders also lead by example. The example set by national leaders who downplayed the pandemic threat, did not follow public health guidelines themselves, and at times actively encouraged rebellion against state public health orders, cannot be easily dismissed.^{138,139} While state governors have the final authority on public health, the Trump administration's recurrent attempts to undermine or outright contradict state orders sowed public distrust and seriously damaged the U.S. response.^{118,140} Trust between a government and its people is a critical ingredient for success in any emergency. The lack of it proved fatal for hundreds of thousands of Americans.

Global Leadership

"To overcome today's fragilities and challenges we need more international cooperation – not less; strengthened multilateral institutions – not a retreat from them; better global governance – not a chaotic free for all."¹⁴¹

– General António Guterres, United Nations Secretary

As with climate change, no country can isolate itself from a pandemic. Pandemics are archetypical "global public bads." We all sink or we all swim, and no country is safe until all countries are safe. There can be no solutions without international collective action.¹⁴²

During the devastation of this pandemic, many countries, including the U.S., have searched for someone to blame. Was it China that concealed the virus until it had spread beyond its shores? Was it the WHO that failed to declare a pandemic until March 11? Both became favored targets, culminating with an announcement on May 29, 2020, that the U.S. would withdraw from the WHO and stop paying its contributions, the largest of any country.¹⁴³

This decision has since been overturned by the Biden administration, but it highlights the importance of U.S. leadership in an increasingly globalized world where existential threats such as pandemics and climate change require global collective action. As the authors of a recent paper in the Lancet point out, all countries, especially large and influential ones like the U.S. must move from "sovereignty to solidarity."¹⁴⁴

Since viruses don't respect boundaries, national governments must work to create more robust systems of global governance that can enhance and support national responses to increasingly frequent global threats. This requires going beyond international collaboration and moving towards greater financial and

leadership commitment to strengthen international early warning and response structures.

Two things are clear. First, a new global architecture is needed to respond to and prepare for pandemics. Some would argue for a reformed and more focused WHO. Others doubt the effectiveness of this model and propose a Global Centers for Disease Control, with a focus on infection – both endemic and pandemic – and a strong mandate to engage as needed within country borders.¹⁴⁵ Such a global agency would benefit from being a network of collaborating centers distributed worldwide, rather than a central institution located, for example, in Geneva.

Second, effective international collective action and the design and implementation of a new global architecture, must have the leadership and full engagement of the U.S.; just as it requires the leadership and full engagement of China, India, Russia, the European Union, South Africa, Nigeria, Brazil and Mexico, among others.

Collaboration and trust among countries is a necessary condition for success in fighting this pandemic and preparing for the next one. This might appear to be a major stumbling block in today's geopolitical environment. However, the devastating impact of COVID-19 on all communities and all countries, and the universal commitment to never let this happen again, provides a shared purpose and agenda for transformational change in global collective action.

Chapter 4: Economics and Finance

Politicians in the United States presented the American people with a false choice between keeping the public safe and healthy, and keeping the economy open. The U.S. needed to do both, but failed to do either. The still rampant epidemic in the U.S. requires major public investment in measures to control the virus, while markedly reduced economic activity attenuates the revenue streams needed to finance this response. In addition, any consideration of the economic consequences of COVID-19 must go beyond the impact on GDP to include the costs of potential long-term disability from Long-COVID and the massive disruptions to individual lives, schools and businesses.

This section discusses the economic and financial dimensions of the pandemic. It also highlights the consequences of U.S. reliance on an employment-based private health insurance system and its lack of universal health coverage.

Economic Impact

“The SARS-CoV-2 pandemic is the greatest threat to prosperity and well-being the U.S. has encountered since the Great Depression.”

– *Cutler and Summers*¹⁴⁶

Effect on GDP

It is useful to set the context of the finance discussion by pointing to how massive the economic losses experienced by the U.S. have been and continue to be. As Table 3 shows, using a methodology developed by Harvard economists David Cutler and Lawrence Summers,¹⁴⁶ we estimate direct GDP losses to total \$11.4 trillion over the next decade. To understand the true depth of economic costs however, health losses must also be considered. These include premature death, long-term health impairment, and mental health impairment. Conservative estimates projecting health losses for only two years (2020–2021), overshadow income losses at \$12.9 trillion. Combined, the total economic loss is projected to be in the range of \$25–30 trillion over the next decade, or at least 135% of annual GDP. By contrast the output losses during the Great Recession were less than a quarter of this amount.¹⁴⁶

Table 3. Estimated economic costs of the COVID-19 crisis in the United States¹⁴⁶

	Loss in billions
Lost GDP (2020–29)	\$11,400
Health Loss (assumed to occur only in 2020–2021)	
• Premature Death	\$6600
• Long-term health impairment	\$3900
• Mental health impairment	\$2400
Total Economic Loss due to COVID-19	\$24,300
Loss as a % of annual GDP	135%

**Cutler and Summers at the time of their writing substantially underestimated the number of deaths the U.S. would suffer. The above table corrects for this in an explicit but nonetheless speculative way since we can only imprecisely estimate mortality over the coming year or longer. Cutlers and Summers were assuming there would be 625,00 deaths through 2021; we assume 50% more deaths.*

Some of the direct income losses may be ameliorated by the stimulus effect of the protection measures for businesses and individuals passed by Congress in 2020. There were five major Congressional actions, the largest of which were the Coronavirus Aid, Relief, and Economic Security (CARES) Act passed in March and the Consolidated Appropriations Act, 2021 passed in December. Costing a total of \$3.7 trillion,¹⁴⁷ they contained a combination of forgivable loans for businesses to prevent layoffs, direct stimulus checks to individuals, and enhanced and expanded unemployment benefits for those suffering job losses.

They also contained a limited amount for controlling the virus, which is discussed in the following section. The total cost of these packages over two years is estimated to be 18% of 2019 U.S. GDP, dwarfing stimulus provided during the Great Recession.¹⁴⁸ Additionally, the Federal Reserve has supported the economy through active monetary policy.¹⁴⁹

These stimulus packages were largely successful in keeping millions of Americans from falling into poverty for the first 8 months of 2020, boosting U.S. consumption by an estimated 6 percentage points and

preventing many business failures.¹⁵⁰ However, when some of the support measures from the CARES Act ended in August 2020, an estimated additional 7.8 million people were plunged into poverty.¹⁵¹

As large as the stimulus packages were, they were insufficient to compensate for a chronically weak social safety net. As 2020 ended, the American Policy Institute reported that almost 27 million Americans were either unemployed, under-employed or had dropped out of the workforce.¹⁵² Food insecurity doubled overall and nearly tripled for families with children. Black (36%) and Hispanic (32%) households were hit much harder than White households (18%), reflecting chronic inequities in access to food.¹⁵³

Americans Are Not Suffering Equally

Small firms, which account for 99% of all businesses in the U.S. and employ almost half of private sector workers, were hit particularly hard by the many lockdowns imposed to control viral spread.^{154,155,156} Sectors most affected by COVID-19 lockdowns, including accommodations, food services, education, arts and entertainment, and recreation, comprise a high proportion of small businesses and employ a disproportionate share of low-wage workers whose livelihoods were most severely disrupted.¹⁵⁶

While White and Black households suffered a similar fall in median income during the Great Recession, White households recovered faster, increasing wealth by 1% between 2010 and 2013, while wealth for Black households continued to fall, exacerbating already high wealth inequality. This left Black households more vulnerable to the income shocks of the COVID-19 crisis.¹⁵⁷

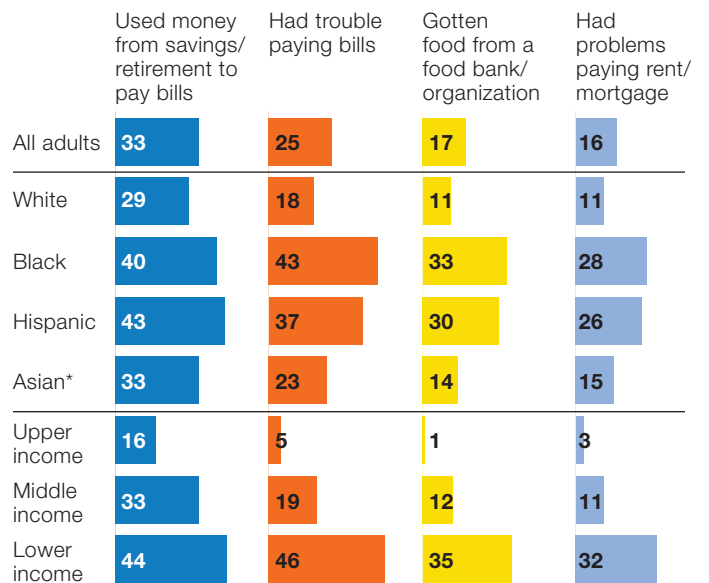
As Figure 7 illustrates, lower income workers, many with few employment protections, disproportionately bore the economic pain of the pandemic. Forty percent of Black and 43% of Hispanic adults reported having to use their retirement or savings to cover basic household expenses, compared to 29% of White adults. A third of all Black adults said they had to resort to a food bank to feed themselves and their families, versus 11% of White adults.¹⁵⁸

Economically, women, especially women of color and mothers of young children, have faced an excessive burden. There were a record 2.1 million fewer women in the labor force in December 2020 than there were in February of the same year.¹⁵⁹ As Figure 9 shows, the unemployment rate for Black women and Latinas was 8.4% and 9.1% respectively vs. 5.8% for White men.^{159,160}

For immigrants, the epidemic exacerbated their already precarious situation in the US (Box 2). Though immigrants only comprise 17.5% of the US labor force, many are deemed essential workers. An estimated 69% of all migrants and 74% of undocumented workers perform critical roles within the health, agricultural, food-supply, domestic, and service sectors,¹⁶¹ placing them at greater risk of contracting COVID-19. At the same time, their marginalized status means they must absorb much of the economic shock of the pandemic with little to no safety net.

Figure 7. Financial pain points during COVID-19¹⁵⁸

Percentage saying they have _____ since the coronavirus outbreak in February, 2020



*Asian adults were interviewed in English only.

Note: White, Black and Asian adults include those who report being only one race and are not Hispanic. Hispanics are of any race. Family income tiers are based on adjusted 2019 earnings.

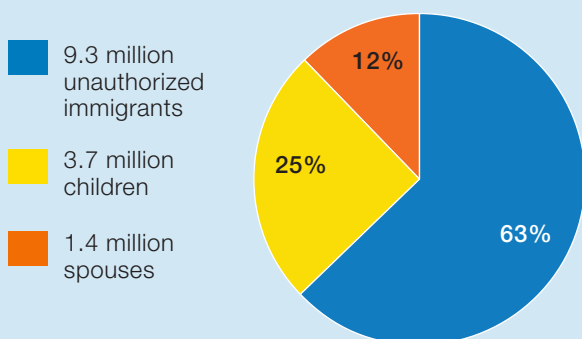
Source: Financial Pain points during COVID-19. Adapted from Economic Fallout From COVID-19 Continues To Hit Lower-Income Americans the Hardest by K Parker et al, 2020, retrieved from <https://fortune.com/2021/01/08/covid-job-losses-women-december-us-unemployment-rate>. Copyright 2020 by the Pew Research Center. Reprinted with permission.

Box 2: Economic Impact of COVID-19 on Immigrants

In June 2020, Congressmen Castro (Democrat–Texas) and Beyer (Democrat–Virginia) released a Joint Economic Committee report evaluating the impact of the pandemic on immigrants, finding that this population experienced higher rates of job loss in 2020 than native-born workers. Between February and April, employment fell 21%, from 28 million to 22 million for foreign-born workers in the U.S., with losses mainly in the education, hospitality, and healthcare sectors.¹⁶²

Under the CARES Act passed by Congress in March 2020, the Migration Policy Institute estimates that 14.4 million immigrants and their families were ineligible for the Economic Impact Payments (Figure 8).¹⁶³ The Congressional Joint Economic Committee places this estimate higher, at 15.4 million immigrants ineligible for payments.¹⁶² For households filing taxes jointly, if any family member used an Internal Revenue Service-issued Individual Tax Identification Number, which is issued to non-residents, spouses, and dependents who are not eligible for a Social Security number, the entire household was considered ineligible for payment under the CARES Act.¹⁶⁴ The stimulus measure in December allowed payments to spouses and children in mixed-status families, though undocumented immigrants were still excluded.

Figure 8. 14.4 million excluded from payments under the CARES Act¹⁶³

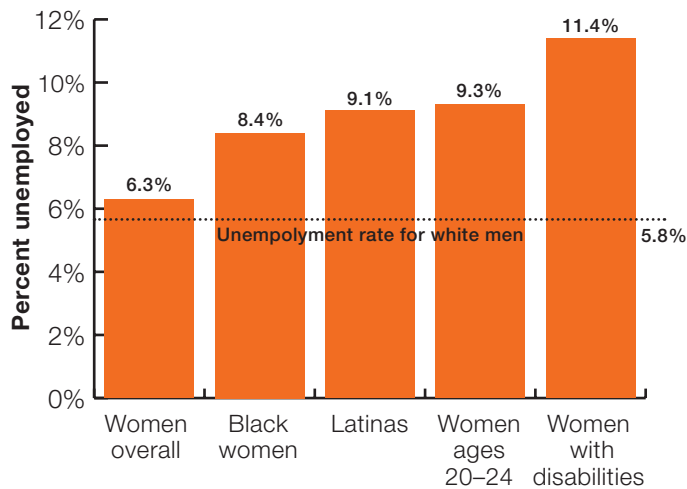


California, Florida, Illinois, New York, New Jersey, and Texas had the highest number of ineligible persons for relief payments. Several states, including California,¹⁶⁵ Illinois,¹⁶⁶ and New York,¹⁶⁷ established limited state-funded disaster relief assistance for immigrants, refugees, or undocumented adults. Of note, under President Biden’s relief package, stimulus payments will be expanded to mixed immigrant status households.

Detainees

From February to August of 2020, the number of detainees in immigration detention centers dropped by 45%, from a mean daily population of 39,319 to 21,591.¹⁶⁸ In 2019, the comparable number was an average of 50,165 detainees per day.¹⁶⁹ The Immigration and Customs Enforcement Agency (ICE) reports that to date 82,585 detainees have been tested for COVID-19, with 531 positive cases in custody.¹⁶⁹ A January 2021 study analyzed interviews with 50 individuals released from 20 U.S. detention centers across 12 U.S. states. The study found gross inadequacies in the treatment of immigrants in detention centers, which failed to comply with CDC recommendations and requirements for pandemic response.¹⁷⁰ Social distancing was impossible for 80% of the participants while eating, and 96% while sleeping. Eighty-two percent reported no access to sanitizer and 42% reported no access to soap on at least one occasion. A quarter (26%) of participants never saw surfaces being disinfected. Of the 50 interviewees, 42% reported experiencing COVID-19 symptoms, 83% of whom were never tested.¹⁷⁰

Figure 9. Women’s unemployment rates, December 2020¹⁵⁹



Source: *Women’s unemployment rates*. Reprinted from *All of the Jobs Lost in December Were Women’s Jobs* by C. Ewing-Nelson, 2021, retrieved from <https://nwlc.org/wp-content/uploads/2021/01/December-Jobs-Day.pdf>. Copyright 2021 by National Women’s Law Center. Reprinted with permission.

Targeting the Virus

While the income support to households and businesses was unprecedented, the amount of additional monies allocated to controlling the virus itself, was a mere 1.6% of new Congressional appropriations.¹⁷¹ The Kaiser Family Foundation estimates that only about \$61 billion of the \$3.7 trillion in the stimulus packages was targeted for public health activities, including surveillance, testing, contact tracing, epidemiology, vaccine distribution, and other mitigation strategies. More than 60% of these monies were stipulated as pass-throughs from the CDC to states, localities, territories, and territorial and tribal public health departments (the appendix contains details of the public health specific appropriations in 2020 and includes references).¹⁷¹

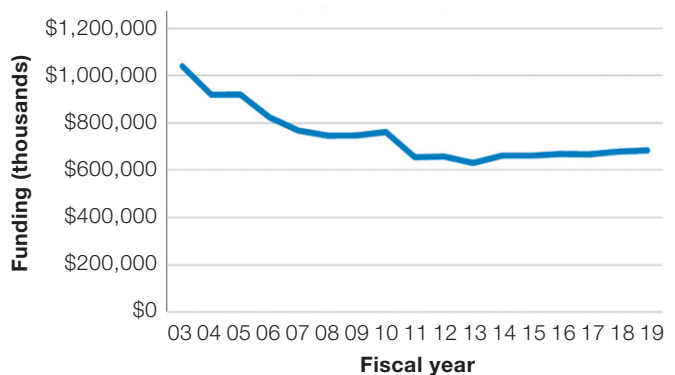
The low level of spending focused on public health was grossly inadequate, contributing to soaring cases and deaths. It also came on top of chronic underinvestment in public health. Despite having a checkerboard of almost 3000 state, local, territorial and tribal public health agencies, the U.S. spends only between 2.5–3% of its total health sector budget on public health.^{172,173} Between 80–90% of this funding comes from state and local budgets, which have been constrained over the past several years.^{174,175,176}

The CDC has been hit particularly hard, with funding falling by almost 10% between 2010 and 2019, while facing worsening public health challenges like the opioid epidemic.^{173,177} Of particular concern is the

steady decline in the CDC’s Public Health Emergency Preparedness allocation, which is the primary federal source of support to state and local emergency readiness and response activities (Figure 10).¹⁷³

Many experts have warned of the dangers of long-term underfunding of public health.^{178,179} The Trust for America’s Health, a respected non-partisan public health policy non-profit, wrote in a 2019 report, “the CDC is America’s first defense against health threats and epidemics and the workforce we count on to improve health and health equity. Yet, funding for the agency has not kept pace with rising public health needs and changing demographics.”¹⁷³ An analysis conducted prior to the pandemic called for an additional \$4.5 billion per year to create a Public Health Infrastructure Fund to strengthen public health capacity in the U.S.¹⁷⁸

Figure 10. CDC funding for state and local preparedness and response, FY 2003–19¹⁷³



Note: Data for FY 2003 to 2015 reflect “State and Local Preparedness and Response Capability,” with additions in FY 2003 (smallpox supplement) and FY 2004 (Cities Readiness Initiative and U.S. Postal Service Costs). Data for FY 2016 to 2019 reflects the sum of funding for “Public Health Emergency Preparedness Cooperative Agreement” and “Academic Centers for Public Health Preparedness.” This difference was owed to a change in the CDC’s reporting practice in its annual operating plans.

Source: CDC Funding for State and local preparedness and response. Reprinted from *The Impact of Chronic Underfunding of America’s Public Health System: Trends, Risks, and Recommendations* by M McKillop, 2019, Copyright 2019 by Trust for America’s Health. Reprinted with permission.

Value for Money?

The U.S. has already spent immense amounts of money responding to this pandemic. Much more will be needed in the coming years. Is this amount too large or too small? Is it being spent on the right things? Opinions differ, and multi-country analyses of these complex issues are beyond the scope of this report.

However, there is an emerging consensus that value-for-money would be improved if a much larger share of federal and state appropriations were targeted to virus control. Cutler and Summers estimate the economic return for test and trace strategies would be 30 times the cost of these basic public health interventions.¹⁴⁶

Countries that have been successful in controlling the virus, such as China and other East Asian countries, have relied heavily on testing, contact tracing and isolation programs.¹⁸⁰ Chen et al and Clark et al, attribute much of the superior performance in East Asia to this focus.^{181,182} It is widely believed in the U.S., however, that lessons from China and other Asian countries have limited relevance. Americans may reject a program of 'test and isolate' as unwelcome interference by the government in their lives, particularly in the aftermath of seemingly endless on and off lockdown programs.

That said, the importance of isolation policies for East Asian success suggests that the U.S. could benefit from supported isolation policies, minimally as a form of insurance. This could be done in two ways: first through providing financial support to interested states wishing to take isolation seriously, and second through a large-scale pilot effort at the national level.

To illustrate what might be achieved, we provide illustrative estimates of the costs and benefits of an expanded testing and supported isolation program in the U.S. Drawing from Chen et al, the numbers conveyed are for a full national program in a time of high transmission and are illustrative and approximate.¹⁸¹ Based on 10 million cases (approximately the number of cases reported in January 2021), a full-scale program would require expenditures of \$26 billion per month (\$7 billion/month for testing using cost estimates from Mina;¹⁸³ \$4 billion per month for support of home-based isolation; and \$15 billion/month for institutional isolation).¹⁸⁴

These expenditures would translate to roughly \$5000 per infection averted and \$1 million per death averted. We assume conservatively a case fatality ratio of .5% and that each isolation would avert one new infection. We also assume a 40% participation rejection rate. As a point of reference, the value of a statistical life is estimated at \$10 million, consistent with U.S. Environmental Protection Agency's statistical value of a human life evaluation.¹⁸⁵ Hence, the benefit to cost ratio would be on the order of 10 to 1. More importantly, a program at this scale could avert several million new cases per month preventing the potential for considerable longer-term disability.

Supported isolation at this scale, together with mask mandates and social distancing, could readily replace

lockdown measures, with significant economic benefits helping to defray or outweigh the costs of the program. The relevance of an ambitious supported isolation program in a time of aggressive vaccine roll-out remains to be determined, but is worth pursuing, particularly for cases with confirmed infection by a variant for which current vaccines may have lower efficacy.

Fragmented Health System Financing & Lack of Universal Health Coverage

The structure of the U.S. health system is fundamentally ill-suited to mounting an effective, coordinated response to COVID-19. Despite having the most well-funded health system in the world, the U.S. reliance on fragmented employment-based private health insurance, and the absence of universal health coverage, have seriously compromised its ability to respond quickly to the threat of the virus. Hospitals were forced to limit access to insured non-COVID-19 patients, threatening their financial solvency; while insurers debated whether the costs of testing were their responsibility or the responsibility of public health departments.^{186,187}

Although the Families First Coronavirus Response Act provided \$1 billion to reimburse facilities for testing uninsured populations,¹⁸⁸ the HHS deemed that only testing for "diagnostic purposes" and "when medically appropriate for the individual, as determined by the individual's attending health care provider in accordance with accepted standards of current medical practice," would be reimbursed.¹⁸⁹ As a result, wide-spread community testing, an invaluable tool for determining community spread of the virus has never materialized.¹⁸³

Theoretically, the federal Provider Relief Fund and other fiscal recovery packages, sought to protect patients from high medical costs associated with COVID-19. However, the complexity of the U.S. insurance system means that large loopholes exist. For example, hospital treatment is only covered for uninsured patients with a primary diagnosis of COVID-19, ignoring the reality that severely ill COVID-19 patients are often admitted with a diagnosis of viral sepsis, which is deemed ineligible for coverage.¹⁹⁰ As a consequence, many Americans were left to face high out-of-pocket costs for testing and treatment for COVID-19.¹⁹¹ FAIR Health, a non-governmental organization (NGO), found that an uninsured patient could face an average bill of \$73,300 for a COVID-19 hospital stay.¹⁹²

Beyond coverage for SARS-CoV-2, massive job losses meant that an estimated 2–3 million Americans may have lost their healthcare coverage.¹⁹³ While the federal government increased Medicaid payments to states to offset costs associated with COVID-19 care, there have

been no enhanced federal incentives for the 12 states that chose not to expand Medicaid eligibility initially under the Affordable Care Act (ACA), to do so now and provide an insurance safety net for the millions without access to coverage. Nor have there been provisions to increase the premium tax credit to support the newly unemployed and their families in transitioning to other coverage options under the ACA.¹⁹⁴

Immigrants have faced even greater challenges. An estimated one third of non-citizen immigrants are uninsured in the U.S.¹⁹⁵ Eligibility for Medicaid and the Children's Health Insurance Program is made available only to "lawfully present immigrants" with documented status in the U.S. for a minimum of 5 years.¹⁹⁶ As a consequence, accessing medical care and, importantly, diagnostic testing was particularly challenging for immigrants during the epidemic. The state-run Medicaid

COVID-19 testing programs excluded diagnostic testing for immigrants precisely because they were ineligible for federal non-emergency Medicaid coverage.¹⁹⁵

In addition to concerns about high out-of-pocket bills related to seeking care for COVID-19 symptoms, immigrants have reported a reluctance to access health services due to fear of deportation.¹⁹⁷ In 2019, the U.S. Citizenship and Immigration Service (USCIS) issued a public charge rule stating that immigration status and path to citizenship may be jeopardized if an immigrant receives public benefits, including health care, long-term care, cash assistance programs, and nutrition and housing services.¹⁹⁸ While emergency Medicaid enrollment was exempt from this ruling during the pandemic, little effort was made to communicate this amendment to immigrant communities.

Chapter 5: Public Health Measures

“When something like this happens, you’re moving quickly. By early February, we should have triggered a series of actions, precisely zero of which were taken.”

– *Ronald Klain, former White House Ebola Response Coordinator*¹¹

A popular narrative in the public health profession and in media commentary is that the main cause of the weak response to COVID-19 in the U.S. was poor government leadership and political interference at federal and state levels. In this chapter we draw attention to missteps by public health agencies that contributed to the severity of the COVID-19 epidemic in the U.S.

Know the Enemy

At the earliest signs of a potential epidemic, it is critical to isolate and characterize the pathogen, rapidly develop and deploy diagnostic tests, and implement large-scale surveillance to track the spread of both asymptomatic and symptomatic cases. The U.S. had ample warning of the virus before it was first detected on its shores. On December 31, 2019, the WHO became aware of unusual pneumonia cases in China. Chinese scientists isolated the virus 8 days later, followed by a published SARS-CoV-2 genome on January 11.^{15,199,200,201}

On January 3, the director of China CDC called his counterpart in the U.S. to warn him of a rapidly

spreading pathogen.¹⁸ A few days later, CDC scientists based in Thailand notified their U.S. colleagues they had deployed a novel diagnostic test to track infections.^{202,203} Yet more than a month passed before the CDC was able to widely distribute a functional test to track transmission in the U.S.²⁰³ During these crucial weeks, the virus had spread undetected. For reasons that have been elaborated by several sources, the CDC failed to adopt existing tests and chose instead to create its own test kits, which were later found to be contaminated (Box 3).^{25,202,203}

The first reported infection was identified in Seattle on January 21, 2020.¹⁶ In February, due to problems with CDC test kits, the University of Washington created its own assay, obtained approval from the Food and Drug Administration (FDA)—the federal agency responsible for approval of vaccine and drug candidates and new assays in the U.S.— and was able to quickly identify community spread. Initially the CDC required that all samples be sent to its Atlanta headquarters, creating bottlenecks in testing and results reporting. Initial testing guidelines restricted testing to those with symptoms who had traveled from China, which allowed the virus to silently spread through communities. The CDC also stopped reporting the number of tests performed on March 1.²⁰² By March 11, the U.S. had tested only 23 people/million while South Korea had tested over 3600/million.²⁰⁴ And while test results in South Korea were available within 24 hours,²⁰⁵ test results in the U.S. often took more than 7 days, limiting their utility for transmission control.^{206,207}

Box 3: Challenges at the Centers for Disease Control and Prevention

“The leadership role of the CDC didn’t hold firm. It has created a lot of confusion and unfortunately a lot of distrust.”

– *Dr. Brent Pawlecki, member of an independent panel evaluating the early CDC response*²⁰⁸

The U.S. CDC is one of the preeminent scientific institutions in the world.²⁰⁹ Unfortunately, despite its extensive experience, the CDC struggled to support management of the U.S. COVID-19 epidemic, with significant delays in testing, scientific errors, and misjudgments. While there is some evidence that political interference and erosion of funding over the last decade contributed to this poor performance, these two factors cannot explain all the missteps by the Agency.

Critical Delays in Response

- Unlike many Asian countries, which responded swiftly to the threat of a novel pathogen, the CDC underestimated the threat to the U.S.²¹⁰ A lack of urgency was apparent in the Agency’s laissez-faire guidance on surveillance, particularly for travelers, allowing the virus to enter the U.S. undetected.²¹¹
- Even when community spread was confirmed in February 2020,²⁸ CDC testing criteria remained overly stringent. Testing was restricted to symptomatic cases for those with recent travel history to China or known contacts.²¹² For example, a previously healthy woman with an unexplained respiratory illness and symptoms similar to those of COVID-19 was transferred to UC Davis Medical Center on February 19, 2020.^{213,214} Because she had no travel history, the CDC declined to provide tests to the medical team treating her.²¹³ Reports indicate it took days of negotiations before the CDC agreed to send a test kit to the medical center,^{213,215} though the CDC denied these reports.²¹⁶ Two days later, this woman became the first confirmed case of community spread in the U.S.^{214,217}
- According to the CDC, the reason for these stringent criteria was a shortages of test kits. But as Jim Curran, Dean of Emory Rollins School of Public Health and a former CDC senior official, noted: “We were told you don’t need to be tested unless you have symptoms...that’s stupid and it’s always been stupid. Policy shouldn’t be based on scarcity.”²⁰⁸

Scientific Errors and Capacity Constraints

- Rather than utilize available WHO tests or kits developed by the CDC office in Thailand,²⁰³ the CDC opted to develop its own assays. From the beginning, time pressure impacted development: lab protocols were not followed, which led to contamination errors that allowed compromised kits to be shipped to state labs.
- The CDC was unable to develop sufficient test kits to permit prompt testing of potentially infected individuals.^{111,203,210} Regulatory hurdles at the FDA compounded this issue, with delays in approval for academic and private sector assays and test kits.²¹⁸ Even when test kits were approved, there was still insufficient supply for states to test adequately.
- On March 1, the CDC took the unusual step of removing data on total number of tests completed from their website,²⁰² noting “[since] states are testing and reporting their own results, CDC’s numbers may not represent all of the testing being done nationwide” (CDC spokeswoman Belsie Gonzalez).²¹⁹
- Although the CDC created a National Open Genomics Consortium (SPHERES) in May,²²⁰ the Agency never built national capacity to conduct adequate COVID-19 genomic sequencing for identification and tracking of emerging variants.^{221,222}
- It is unclear if the CDC was politically sidelined and therefore prevented from participating in vaccine roll-out plans.²²³ It did, however, develop an overly complex vaccine prioritization scheme for states that proved impossible to implement.^{224,225,226}

Political Interference

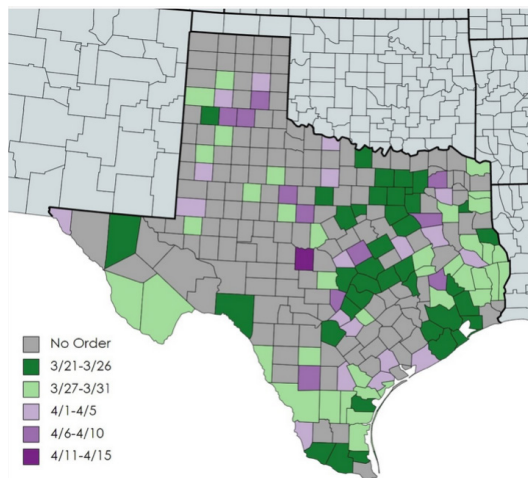
There is no doubt that the Agency was hampered by political interference.²²⁷ The White House delayed CDC guidelines on school and business re-openings, ignored concerns about religious gatherings, allowing churches to reopen, authorized questionable treatments, and pushed the Agency to change testing guidelines in August 2020.^{210,228} White House officials also began screening drafts of the internationally renowned CDC Morbidity and Mortality Weekly Report prior to publication.²²⁹

The Blunt Instrument

The failure in testing and surveillance may have contributed to the severity of the first major epidemic in New York in March,²¹¹ during which nearly 17,000 people died in six weeks.²³⁰ As COVID-19 spread unmitigated, shelter-in-place orders or “lockdowns” as they were called, were implemented across the U.S., which led to large-scale closures of non-essential businesses and schools. There was no guidance from the CDC on sheltering in place or school closures beyond the 2017 pandemic influenza guidance. As a result, initial shelter-in-place orders lasted up to nine weeks in some localities, while in others they were never implemented at all.²³¹ When rigorously implemented, lockdowns were associated with a reduction in the case reproductive number R to <1 , causing daily caseloads to decline (Box 4).²³²

Even within the same state there was considerable county-level variation in whether lockdowns were implemented, how long they were in place, and what they included, as the map of Texas shows (Figure 11).

Figure 11. Lockdown orders by date enacted in Texas counties, March to April 2020²³¹



Colors indicate the range of dates at which lockdown orders became effective.

Lockdown Replacement Package

Lockdowns are an extraordinarily blunt policy instrument, resulting in massive social and economic collateral damage.^{233,234,235} In theory, initial lockdowns bought time for public health agencies to design and begin implementation of a “lockdown replacement package” of interventions, which would reduce, if not fully obviate the need for future lockdowns. Based on the successful experience of East Asia in controlling the virus, a lockdown replacement package in the U.S. could have included:

- Widespread community testing and contact tracing.
- Strong isolation and quarantine policies, with both financial and social support, and consequences for non-compliance.
- Mandatory mask wearing and pragmatic social distancing, accompanied by appropriate enforcement of these rules.
- Banning gatherings and events, especially large indoor gatherings, that are ideal settings for transmission.
- Strong border controls, including border closures as appropriate, comprehensive screening and testing at ports and borders to identify imported cases, and enforced and supported quarantine for those entering the country.

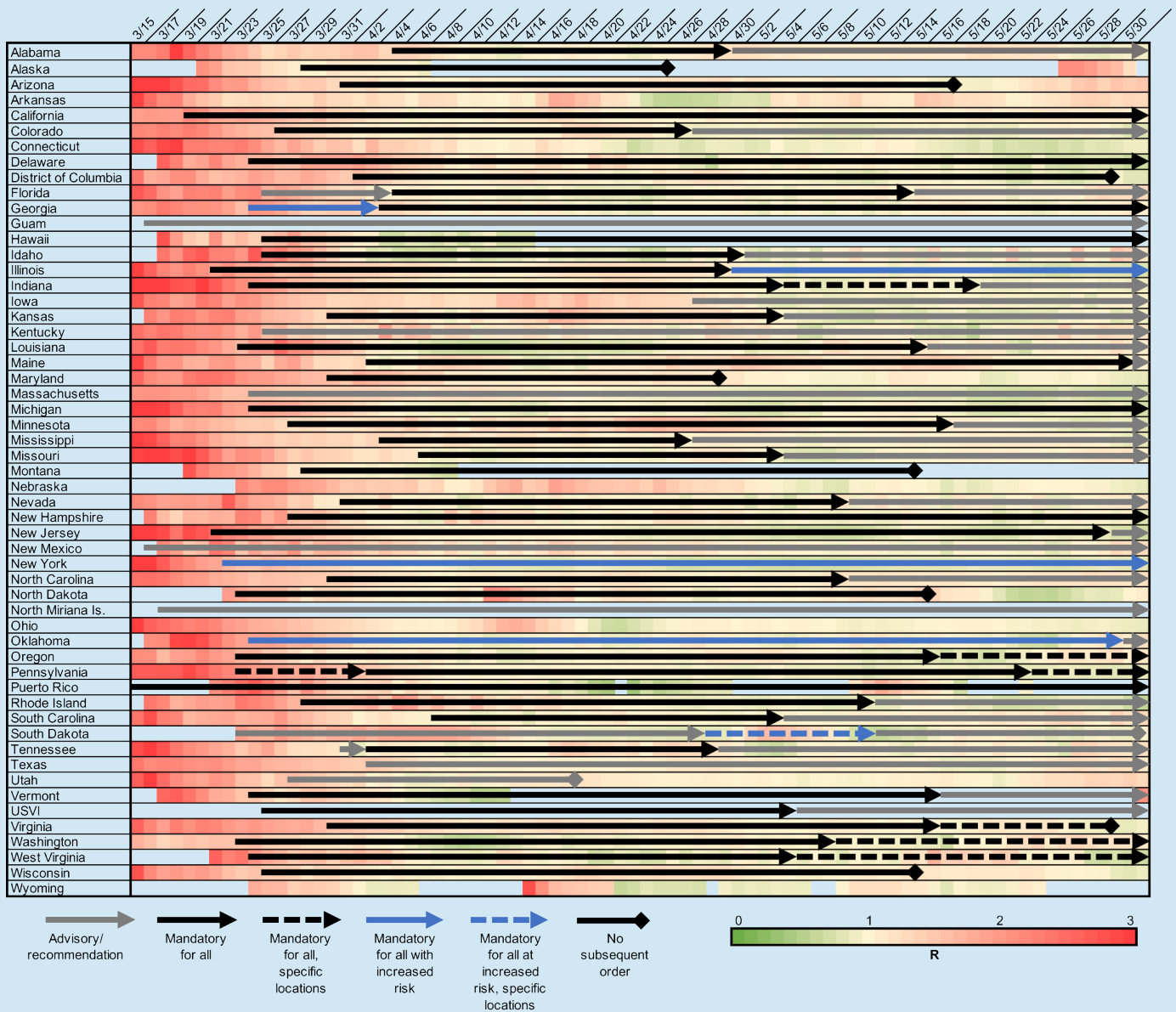
Lockdown replacement packages never materialized, leaving states to order recurrent lockdowns, causing immense damage to the economy and exhausting the cooperation of the public. School closures have been particularly problematic for many children and parents (Box 5).

Box 4: State Lockdown Orders and Impact on Reproduction Rates

Figure 12 maps lockdown orders by state and their effect on R, the case reproduction rate of an infection, which denotes the expected number of cases directly generated by one case in a population of susceptible individuals. R-values range from a low of 0 (shown in green) to a high of 3 (shown in red). Thirty-one states have sufficient data to calculate the difference in R from March 15 to May 31.²³² Our analysis shows that stay-at-home orders are associated with a substantial decrease in effective reproductive rate. Taken across

all 31 states we find an average decrease in R of 1.7 from R = 2.7 on March 15, to R = 1 on May 31. While this trend is robust and supports the effectiveness of lockdown orders, it is important to note that these data are imprecise and influenced by confounders such as testing rates, population size, demographics, and adherence to orders and their enforcement. Further analysis is required to accurately quantify the effectiveness of lockdown orders.

Figure 12. State lockdowns, March to May 2020^{231,232}



Box 5: Impact of Lockdowns – School Closures

School closures due to COVID-19 have impacted 50 million children in the U.S.²³⁶ In Spring of 2020, 13,506 school districts closed across the U.S.; by May, 48 states closed in-person learning for the remainder of the 2019/2020 school year.²³⁷ Without national guidelines to support decision-making, state and local health jurisdictions made varied recommendations on school closures and re-openings. One year later, a variety of educational learning models are being implemented across the country (e.g. in person and remote, only remote, or in person with social distancing measures in place). Unfortunately, school districts around the country are reporting increasing numbers of failing students, with low-income students fairsing the worst.²³⁸

Black and Latinx children have been disproportionately affected. They are more likely to be engaged in remote learning without any live instruction while also having less access to computers and high-speed internet.^{238,239} Private schools are more able to implement safety measures that allow them to stay open, and when online teaching is required, they are better equipped to provide quality education. This has further widened the gap between private and public school students.²⁴⁰

Modelling by McKinsey, a consultancy, estimated that the average U.S. student could lose \$61,000 – \$82,000 in lifetime earnings due to COVID-19 learning losses.²³⁸ This analysis estimates lifetime losses of more than \$110 billion in annual earnings across current kindergarten through grade twelve students.²³⁸

America's children are also suffering socially and psychologically from COVID-19 and from school closures. A survey conducted early in the pandemic found that 64% of teenagers reported concerns that COVID-19 will have long lasting mental health effects on their generation.²⁴¹ In October, the CDC reported that when compared to 2019, mental health related emergency department visits increased by 24% for children aged 5–11 and 31% for adolescents aged 12–17.²⁴² These statistics underrepresent mental health problems, as they do not reflect urgent and primary care visits for pediatric mental health concerns. School closures exacerbate these issues – in addition to social isolation from closures and rising rates of domestic violence in homes,^{243,244} students now lack access to the mental health, developmental and social support that is typically provided through the educational system.²⁴⁵

Isolation and Quarantine

Isolation of positive cases, with quarantine and testing of those who may have been exposed, have been

critical interventions in controlling the pandemic in countries as diverse as Australia, Germany and Taiwan. **Box 6** highlights Germany's policies.

Box 6: Isolation and Quarantine in Germany

Germany's isolation policies have earned praise internationally. National guidelines for isolation of positive cases are legally enforceable under section 30 of the Infection Protection Act.²⁴⁶ Individuals who test positive are prescribed mandatory isolation by the public health office. Isolation is required for a minimum of 10 days after the start of the isolation period or following 48 hours without symptoms.²⁴⁷ Isolation orders are terminated by the public health office in coordination with the individual's medical provider. Violations can result in fines or imprisonment;^{246,247} over 35,000 fines had been issued as of October 2020.²⁴⁸ These isolation orders are estimated to have reduced transmission by six percent.^{249,250}

Quarantine orders are also legally enforceable and are mandatory for a minimum of 14 days for all suspected COVID-19 patients. They may be ended only when permitted by the public health office.^{246,247}

Employers are required to pay for up to six weeks of mandatory isolation or quarantine. State governments reimburse employers for any payments made to employees while employees were under isolation or quarantine, and unable to work.²⁵¹ Self-employed and gig workers who aren't allowed to work while under mandatory isolation or quarantine, can apply for compensation directly from the state, with payments to these individuals based on prior year tax returns.²⁵²

Institutionalized isolation (i.e. isolation in designated hotels or other venues) plays an important and ongoing role in Japan, South Korea and Vietnam in their efforts to eliminate the virus or maintain low-level endemicity.^{180,253} Supported isolation, which provides food delivery, financial support, medical monitoring and mental health services has been effective in a range of countries and can be implemented both for those isolating at home and for those isolated in designated facilities.^{180,253,254}

The U.S. never adopted supported isolation policies at scale. Current policy requires positive individuals to isolate at home and recommends that contacts quarantine similarly. These policies neglect the reality of many disadvantaged low-income Americans who live in multi-generational households or cannot afford to stay out of work for prolonged periods of time.²⁵⁴ In addition, it is common for essential workers to share apartments with colleagues so as not to return home and potentially infect their families. This provides no physical space to isolate or quarantine for those most at risk, and efficiently spreads viral transmission. It should be noted that some cities have provided support for isolation of the homeless and very low-income populations, including Boston, Chicago, Los Angeles, New York, Portland, San Francisco and Seattle.^{255,256,257}

Effective isolation policies might have prevented dramatic rises in cases and deaths had they been instituted early in the pandemic when endemicity was low.^{233,234,258} Unfortunately, failures in testing and effective contact tracing made it difficult, if not impossible, to identify cases and control the pandemic through this proven public health intervention.^{202,203,204,206}

Mask Mandates

Face coverings have been recommended to prevent transmission of respiratory diseases since the 14th century,²⁵⁹ and have been widely used since the early 20th century for disease control.²⁶⁰ In East Asia, because of its experience with SARS in 2003 and MERS in 2012, mandatory use of masks in the community was immediately adopted as a common sense, low-cost way to prevent transmission of COVID-19.²⁶¹

Various studies and models have shown that the aggregate effect of masking alone can reduce $R < 1$.²⁶² Some models show that if 80–90% of the population used masks consistently the disease could be eliminated.²⁶³ Analyses by Goldman Sachs suggest that reasonable compliance with a national mask mandate, which is cost-less except for enforcement, could substitute for renewed lockdowns, which would otherwise reduce U.S. GDP by 5% or over \$1 trillion.²⁶⁴

The Asian experience with masks makes the early position against community use of face masks by

public health experts at the WHO and in the U.S. particularly perplexing. On January 30, 2020 Dr. Nancy Messonnier, Director of the National Center for Immunization and Respiratory Diseases, claimed on national television: "We don't routinely recommend the use of face masks by the public to prevent respiratory illness. And we are certainly not recommending that at this time for the new virus."²⁶⁵ In testimony to Congress on February 27, the CDC Director rejected the use of face masks as a way to reduce spread of the disease; and the Surgeon General later emphatically tweeted to the world "Seriously people – STOP BUYING MASKS! They are NOT effective in preventing general public from catching #Coronavirus."^{266,267} They later justified this guidance by saying they were seeking to protect limited mask supplies for medical personnel. But the damage was done. The initial unequivocal rejection of mask usage caused public confusion and a subsequent partisan divide on the issue. Mask requirements became a rallying cry for some Americans who claimed civil liberty violations, rather than simply accepting masks as a useful tool for controlling transmission.

Fortunately, many state, county and local public health departments diverged from federal guidelines and instituted mandatory mask policies early in the pandemic. This allowed a natural experiment, which showed measurable differences in COVID-19 case rates in states with mandatory mask orders versus those without them.^{268,269,270}

Banning Large Gatherings and Events

Crowding indoors, particularly in poorly ventilated spaces, creates the ideal scenario for COVID-19 transmission. Interaction between people is the most important facilitator of COVID-19 spread, with close exposure to respiratory droplets or aerosols as the driving mechanism. Studies indicate that it is likely that 10%–24% of people are responsible for over 80% of cases.²⁷¹ Unfortunately, these "super-spreaders" can be pre-symptomatic or asymptomatic and are therefore more likely to be out of their homes and interacting with the public than symptomatic patients.

Sporting events, conferences, church services, concerts, university dormitories and political rallies provide perfect settings for viral spread. Restricting such gatherings and events is a basic measure for COVID-19 control and has been widely adopted by countries that have successfully limited transmission. In Germany, an early ban on large gatherings is estimated to have reduced transmission by as much as 40%.²⁷² Failure to impose national restrictions on gatherings led to a number of now notorious super-spreader events such as the Sturgis Motorcycle Rally, a choir practice in Washington State, and a funeral in Georgia.²⁷³

The CDC recommended rescheduling large gatherings during the initial national lockdown in March 2020.²⁷⁴ Since then, it has published a list of “considerations for events and gatherings”²⁷⁵ for local authorities to review and has developed a tool for evaluating preparedness for gatherings. This guidance stops well short of recommending bans on events and gatherings. Some states have allowed large public gatherings to continue unrestricted, while others have not placed limits on the number of people who can gather but require event organizers to enforce social distancing practices.²⁷⁶ Yet other states and counties have adopted strict controls on gatherings and events. For example, as cases rose in California, San Francisco prohibited gatherings with anyone outside of one’s household. From November to December, Washington State restricted outdoor gatherings to 5 people, and prohibited indoor gatherings unless attendees had quarantined for 14 days prior.²⁷⁶

Research shows that obeying social distancing rules is a partisan issue, with COVID-19 risk perceptions dependent on political affiliation.^{277,278} Gollwitzer et al used geotracking data from 15 million cell phones per day in 3,025 counties to show that counties that voted for then candidate Trump in 2016 engaged in 14% less physical distancing than those that voted for Hillary Clinton.²⁷⁹ The study also showed correlations between consumption of conservative media and decreased physical distancing. These partisan differences in social distancing were reflected in cases, with ‘right’ leaning counties experiencing higher rates of COVID-19 infections.²⁷⁹

Border Control Policies

Modeling suggests that early travel bans, in conjunction with local public health measures, may have been effective in slowing community spread in China.²⁸⁰ Early and rigorous travel bans, combined with strict quarantines of incoming travelers and measures to track and isolate positive cases, have contributed to COVID-19 control in a number of countries.

The U.S. implemented travel restrictions for people originating in China on January 31, 2020. Despite this, nearly 40,000 passengers from China entered the U.S. between February 2 and April 4.²⁸¹ In March, the U.S. also restricted travel from Iran, the European Schengen area, Ireland, the United Kingdom, and Brazil, and suspended issuing routine visas for these countries at all U.S. embassies and consulates.²⁸²

While many Asian and African countries implemented early screening at airports, the U.S. never consistently instituted these policies as part of a comprehensive public health response.^{283,284} With new more transmissible strains emerging in many parts of the world, implementing strong border checks now may be effective

in reducing or slowing the spread of new variants. On January 12, 2021 the CDC issued an order requiring all international travelers to show a negative pre-departure test for the virus or proof of recovery from a previous infection.²⁸⁵

Genomic Surveillance

Regular genomic sequencing for surveillance of SARS-CoV-2 mutations is an important public health tool: the more patients infected with COVID-19, the higher the likelihood there will be mutations that confer evolutionary advantages to the virus. Robust genomic sequencing and epidemiology programs can ensure that new variants, particularly ones that can escape vaccine immunity, do not spread undetected through the U.S.

Despite having the largest COVID-19 outbreak in the world, the U.S. has not invested in a strong SARS-CoV-2 genomic surveillance program. In May, the CDC created the National Open Genomics Consortium (SPHERES)²²⁰ in conjunction with academia and industry, but never built a national infrastructure for large-scale sequencing.^{221,222} As of January 2021, the U.S. ranked 38th out of 130 countries on national genomic sequencing.²²¹ Informed by experience with prior infectious disease outbreaks, many less wealthy countries like Gambia, Equatorial Guinea and Sierra Leone have higher sequencing rates than the U.S.²²² Admittedly, these countries have had fewer reported cases than the U.S., but they also have considerably more constrained laboratory capacity. Recent data show that until January 15, the U.S. had sequenced as few as 0.3% of COVID-19 infections²²¹ compared to nearly 5% for the U.K., 12% for Denmark, and 60% for Australia.²⁸⁶ Without dramatically increased surveillance of emerging variants, the U.S. may soon find itself where it was a year ago during the initial emergence of SARS-CoV-2 – “flying blind.”²²¹

The Importance of a One Health Approach

The response to COVID-19 has been impeded by a historically siloed approach to emerging infectious disease threats, with insufficient collaboration across disciplines and stakeholders. The United States Agency for International Development (USAID) Pandemic Emerging Threats (PREDICT) program, which supported research on emerging pathogens adopted a ONE Health approach to epidemic threats. PREDICT was officially discontinued in September 2021.²⁸⁷ In October 2019 USAID closed its site at the Wuhan Institute of Virology which was studying bat-associated beta coronaviruses.²⁸⁸ These decisions have severely limited the ability of the U.S. to track emerging zoonotic

threats. Future efforts must be reoriented to emphasize disease prevention, leveraging a multidisciplinary One Health approach that focuses on bio-surveillance at the human-animal interface. Using lessons learned from this pandemic, roadmaps for a One Health approach

should be developed with local and state public health actors. Efforts at national and international levels, should focus on designing plans to engender trust across sectors, and among public and private entities.

Chapter 6: Communications, Trust and Engagement

Building and Maintaining Trust

Due to the rapidly spreading nature of a pandemic, mitigation measures to stop transmission require strong trust between the government and the people. The public must believe that the government will act in their best interest to prevent unnecessary mortality, morbidity and economic distress. Clear and reliable information, in conjunction with medical, economic and social protections, serve as a foundation for public trust in government during emergencies. A trust deficit in the U.S. had been identified in 2019 as a risk factor

that could lead to a poor pandemic response. On the Global Health Security Index for overall pandemic preparedness, the U.S. received the lowest possible score for public confidence in government.²⁸⁹ In March 2020, the Pew Research Center reported that almost 60% of Americans surveyed did not have confidence in the U.S. government to effectively respond to a public health emergency.²⁹⁰ During the COVID-19 pandemic, research has shown (Figure 13) that low government trust was associated with higher cumulative COVID-19 death rates.²⁹¹

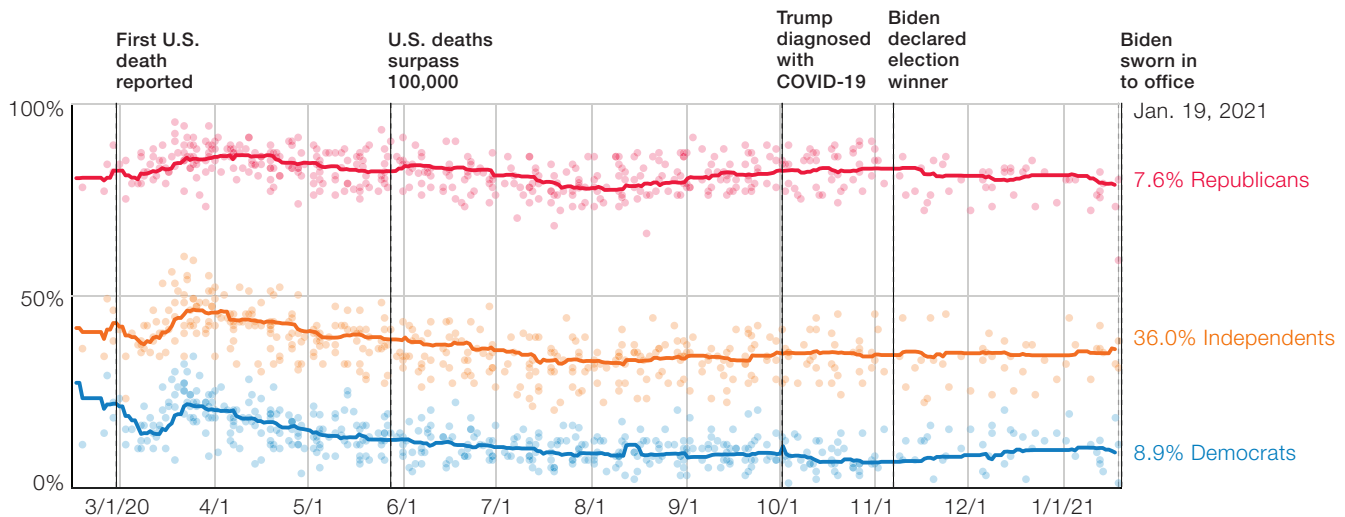
Figure 13. A comparison of government trust and cumulative COVID-19 death rates²⁹¹



*Cumulative age-standardized deaths per 100,000, 150 days after first death

Source: A comparison of government trust and cumulative COVID-19 death rates. Reprinted from Foreign Affairs, by T. Bollyky, 2020, retrieved from <https://www.foreignaffairs.com/articles/unitedstates/2020-10-23/coronavirus-fighting-requirestrust>. Copyright 2020 by Foreign Affairs Magazine. Reprinted with permission.

Figure 14. Approval of President Trump's response varies widely by party²⁹²



Source: *Approval of President Trump's response varies widely by party*. Reprinted from 538, by N. Silver, 2020, retrieved from <https://projects.fivethirtyeight.com/coronavirus-polls>. Copyright 2020 by 538. Reprinted with permission.

Numerous surveys and polls have shown that confidence in government is highly correlated with political affiliation. While over 50% of Americans disapproved of former President Trump's COVID-19 response,²⁹² significant differences emerged when responses were disaggregated by political affiliation: 75.6% of Republicans approved of the Trump administration's management of the pandemic, compared to 35.6% of independents and 8.2% of Democrats (Figure 14).²⁹²

A recent survey regarding public trust in reliable vaccine information showed that 73% of respondents had trust in the CDC overall;²⁹³ when disaggregated by political affiliation, however, 88% of Democrats and only 57% of Republicans trusted the Agency. Surveys also suggest that political affiliation is more predictive of vaccine hesitancy than any other factor, with 42% of self-identified Republicans reporting they would not get vaccinated.²⁹³ Building and repairing government trust will be essential to improving adherence to public health measures and supporting stronger public engagement for COVID-19 control.

Communicating Clearly

“COVID will be used someday as the worst example of risk communication in the modern era.”

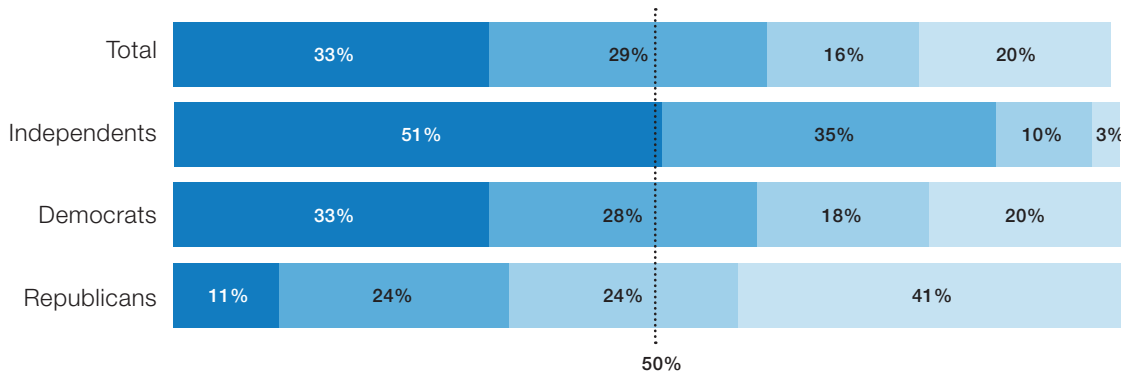
– David Rejeski, Former Director, Wilson Center Science and Technology Innovation Program²⁹⁴

As mentioned above, reliable, clear, and consistent communication is an essential response tool in public health emergencies. Sharing information in a timely manner, and using language that is accurate, transparent and empathetic, is the foundation of strong health communication strategies. Kim and Kreps note that the “role of government [communication is] to unify and motivate public groups during national emergencies to promote health risk prevention, response, and recovery from severe damage.”²⁹⁵ There is no doubt that conflicting messages from national leaders, state governors and public health experts sowed considerable confusion in the minds of the American people.¹⁴⁰

Messages from Heads of State are amplified during times of crisis. While medical and scientific experts were raising the alarm that COVID-19 was spreading through the U.S., the White House presented the narrative that the virus was a minimal risk to Americans. Early in the pandemic former President Trump repeatedly remarked that COVID-19 “was under control” and “just like the flu,”²⁹⁶ despite admitting later on, “I wanted to always play it down. I still like playing it down. Because I don't want to create a panic.”²⁹⁷ Even when he announced federal recommendations for mask wearing in early April, he immediately undermined the advice by adding “I am choosing not to do it.”²⁹⁸ He also made scientifically unsound and sometimes dangerous comments that had real world implications. For example, during an April press briefing President Trump raised the possibility of inhaling or ingesting bleach

Figure 15. Public concerns about political pressure influencing FDA vaccine approval, August to September 2020²⁹⁹

How worried are you, if at all, that the U.S. FDA will rush to approve a coronavirus vaccine without making sure that it is safe and effective due to political pressure from the Trump Administration?



Source: Public concerns about political pressure influencing FDA vaccine approval. Reprinted from Kaiser Family Foundation by L Hamel et al, 2020, retrieved from <https://www.kff.org/coronavirus-covid-19/report/kff-health-tracking-poll-september-2020/>. Copyright 2020 by Kaiser Family Foundation. Reprinted with permission.

to treat COVID-19. Calls to Poison Control centers for disinfectant ingestions increased in at least five states following this misinformation.³⁰⁰ Another study showed that internet searches for hydroxychloroquine surged over 1,000% after the former President endorsed the unproven drug via Twitter and in a national press briefing.³⁰¹

Medical professionals were also on the receiving end of misinformation. In October, the President accused doctors and hospitals of filling their own coffers and diagnosing patients incorrectly with COVID-19 to increase case numbers.³⁰²

In early fall, the President suggested that he might pressure the FDA to authorize vaccines on an accelerated timeline. Following this announcement, a survey showed that 62% of Americans were concerned that the administration would rush approval of a vaccine without ensuring its safety (Figure 15).^{303,304}

Messaging by the Public Health Experts

“The urgent issues confronting society require a knowledgeable public able to make choices base on unbiased information – not fear, compulsion or conspiracy theories. Every institution must play its part in restoring facts to their rightful place.”

– Richard Edelman, CEO of Edelman³⁰⁵

With the White House controlling the COVID-19 narrative, the CDC was sidelined from its typical role of official public health communications hub for epidemics and pandemics. During the 2009 H1N1 influenza pandemic, the CDC held 32 out of 35 press conferences in the first 13 weeks.³⁰⁶ By contrast, from March to June, the former President led approximately three-fourths of all press briefings on COVID-19.^{306,307}

U.S. agencies have well-delineated pandemic communication and public outreach plans. For example, the CDC has numerous available expert resources, including communication response strategies, trainings, tools, and templates.³⁰⁸ Although these are widely available, they seem to have been incompletely or inadequately adapted and implemented, leading to confusing, complicated and incorrect messages to the public.

Despite rapidly evolving science, scientific leaders made a series of declarations that were later reversed, undermining trust in the experts.³⁰⁹ CDC Director Robert Redfield went on national television numerous times, extolling the narrative that COVID-19 was a low threat to Americans.²⁰⁸ This was later justified as an attempt to reassure the public, but instead conveyed a lack of urgency and fostered complacency towards the evolving U.S. epidemic. The CDC’s messaging on the use of masks was particularly problematic as mentioned above.

Unfortunately, conflicting and inconsistent advice from experts fed into the populist narrative extolled during the Trump presidency that sowed skepticism of science, facts and the mainstream media. In a society where much of the news is absorbed from social media

platforms, misinformation is easy to spread and difficult to dispel. A June 2020 Pew Research Center study found that a quarter of U.S. adults believed that the pandemic was likely planned by powerful people.³¹⁰ Another poll found that 28% of American adults believed that Bill Gates was using vaccines to implant microchips in the American public.³¹¹

Empowering Communities

“Community engagement is key to overcoming mistrust and building confidence through actions like using many channels of communication, engaging trusted messengers with roots in the community, and working towards racial equity.”

– *National Academies of Science*³¹²

Pandemic response cannot succeed without commitment from the public to engage in risk mitigation activities. Fostering inclusive community engagement, a process in which community members work collaboratively with government and NGOs to effect changes in behavior, is crucial for tailoring pandemic responses to reflect local realities. Public engagement has been

used effectively in past epidemics including H1N1, Zika and Ebola Virus Disease.^{313,314} Community engagement can ensure public health programs are owned by local communities, which promotes buy-in and commitment to prevention and response measures.

State, county and city governments are the best positioned to work with local community groups, schools, and non-profit organizations to collaborate on locally driven decision making, program design, planning, and delivery of services. To ensure optimal effectiveness, engagement activities must include groups traditionally left out of decision-making, such as the elderly, people with disabilities, recently incarcerated persons, immigrants, non-English speakers, homeless individuals and people of color.³¹⁵ Engagement of these groups during COVID-19 was and continues to be crucial for several reasons. First, it is a fundamental equity and ethical issue: historically disadvantaged voices deserve to be heard and to participate in the development of policies that impact their lives. Second, engaging with all members of a community ensures resiliency and social cohesion. Third, social and cultural factors that are unique to each group influence knowledge, attitudes and behaviors about COVID-19. **Box 7** highlights one of many initiatives led by civil society during the pandemic.

Box 7: Civil Society Engagement in California – Volunteer Vaccine Availability Website

In the absence of clear federal and state vaccine plans, an implementation vacuum propelled a civil society response in California. VaccinateCA is a crowdsourcing website designed by volunteers to improve Californians' access to vaccines. As of January 2020, California lagged behind many states in vaccine delivery.³¹⁶ The state lacks vaccine availability reporting systems that are available in states such as Texas, leaving citizens to fend for themselves. VaccinateCA founder Patrick McKenzie, a tech worker and writer, noted this critical gap and recruited volunteers using social media

platforms. Together, the group built an unofficial vaccine availability dashboard. Hundreds of additional volunteers quickly organized to call health care providers, hospitals and pharmacies regularly to assess vaccine availability, confirm local vaccine eligibility and provide instructions for vaccination scheduling. The group has created an up-to-date user-friendly website, with zip-code search capabilities and scheduling links to allow residents to easily and efficiently schedule their vaccinations.^{317,318}

Chapter 7: Health System Resilience

“Since the coronavirus first appeared in the United States a year ago, our overwhelmed healthcare system and workers have been stressed to the breaking point. Still, they have worked tirelessly to care for victims of the disease and shown resilience.”

– Lewis Nelson, *Clinical Chair of Emergency Medicine, Rutgers New Jersey Medical School*³¹⁹

An effective public health emergency response requires a resilient healthcare system. Although U.S. hospitals have significant technological and intellectual medical capacity, COVID-19 surges have repeatedly stressed local hospitals and clinics, diminishing health system resiliency. Pressure points included low bed capacity,

a strained workforce, and limited availability of PPE, medications and oxygen. In this section, we analyze the healthcare services response to COVID-19 across four domains: health services capacity, human resources, supplies, and vaccine delivery.

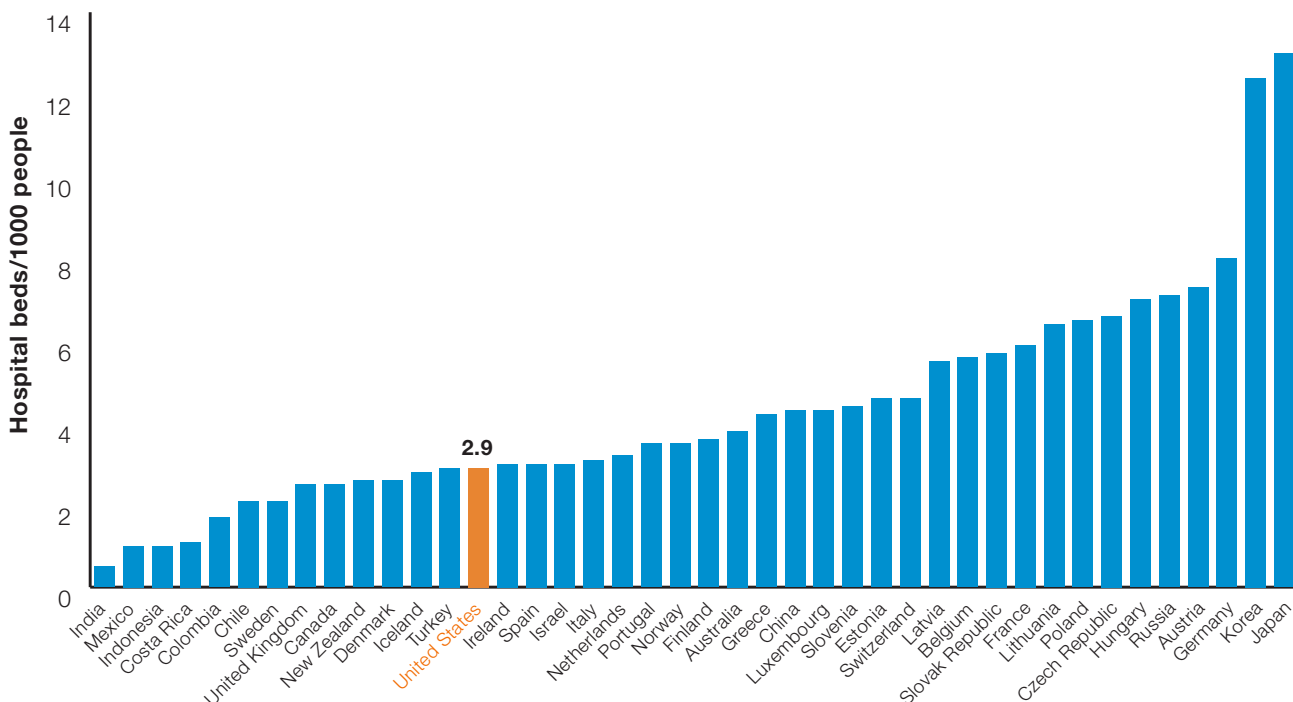
Hospital and Primary Care Capacity: Overflow and Spillover Effects

Hospitals Pushed to the Brink

“Pandemics are global, but the battle against them is won and lost in local trenches.”

– Council on Foreign Relations³²⁰

Figure 16. Hospital beds/1000 people in OECD countries³²¹



Data Source: OECD. Hospital beds (indicator). OECD Data. Organisation for Economic Co-operation and Development, 2019. Internet. Accessed 27 February 2021 at <https://data.oecd.org/healthqt/hospital-beds.htm>

The U.S. entered the COVID-19 pandemic with fewer hospital beds per thousand (2.9) than most Organization for Economic Co-operation and Development (OECD) countries (Figure 16).³²¹ At various times U.S. hospitals and clinics faced critical shortages in intensive care unit (ICU) and acute care bed capacity, and the supplies needed to care for patients, including severe shortages in PPE, ventilators, and testing supplies (e.g. swabs, cartridges, reagents).³²²

While hospitals are required to have emergency preparedness and response plans to meet the Joint Commission for the Accreditation of Hospitals and Healthcare Facilities standards, they have received limited funding from the government to bolster their response plans.^{323,324} Disaster plans have focused on responding to pandemic influenza and other natural disasters, and not novel pathogens. Hospitals have consistently reported limitations in their ability to respond to emergencies even in areas with high bed capacity, with one survey in New York finding that less than 17.5% of sampled hospitals felt their disaster plans were sufficient to respond to an emergency, and almost 73.3% reporting they would not be able to continue operations for a week without additional external resources if there was a disaster event.³²⁵

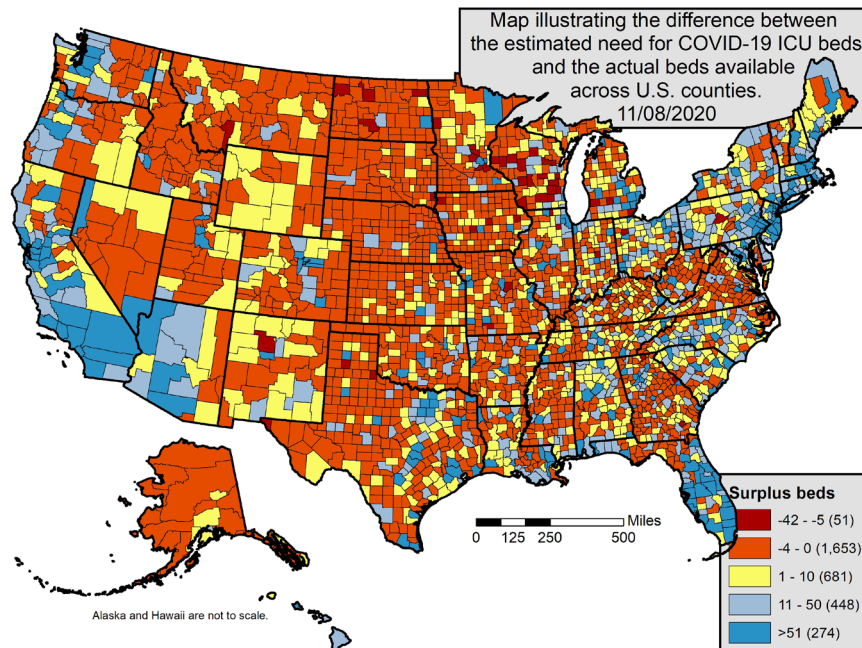
Most hospitals cancelled elective procedures and admissions in an attempt to reserve capacity for

COVID-19 hospitalizations.^{326,327} ICU capacity has been repeatedly strained due to the scale of the U.S. epidemic (Figure 17).³²⁸

Strains in ICU capacity led to poor patient outcomes. In a cohort study of 8,516 patients admitted to 88 U.S. Veterans Affairs hospitals, COVID-19 patients in hospitals with high ICU occupancy were found to have double the risk of mortality compared to patients in hospitals with low occupancy.³²⁹ Many hospitals converted endoscopy suites, operating rooms, maternity and neonatal wards into acute care or ICU beds, and erected tents in lobbies and parking lots to expand capacity.³²⁷

Many hospitals experienced delays in treatment for patients with non-COVID illnesses that could lead to poor outcomes (e.g. heart attacks, cancer etc.).^{330,331} The causes of these delays are multifactorial, including patients avoiding acute and preventive care and cancellation of “non-urgent” procedures like cardiac catheterizations. According to a recent study, 40% of U.S. adults delayed or avoided medical care due to COVID-19, including 12% who required urgent or emergency care, and almost 32% who needed routine care.³³² Institutionalized populations were at particularly high risk for mortality due to the virus (Box 8).

Figure 17. Intensive Care Unit bed capacity, October to December 2020³²⁸



Hawaii and Alaska are not to scale. Data represent 10/26/20-11/08/20 Map by: RTC: Rural.Lillie.greiman@umontana.edu

Source: *Intensive Care Bed Capacity*. Reprinted from *America at a Glance: Early Fears Realized as COVID-19 Surges in Rural Counties* by RTC:Rural, 2020, <http://rtc.ruralinstitute.umt.edu/america-at-a-glance-early-fears-realized-as-covid-19-surges-in-rural-counties>.

Box 8: Institutionalized Populations at High Risk

Long-term Care Facilities

COVID-19 has amplified existing vulnerabilities of older adults in the U.S. In particular, the pandemic has ravaged long-term care facilities (LTCFs), including nursing homes and assisted living facilities.^{333,334} By the last week in November 2020, more than 100,000 LTCF patients and staff had died from COVID-19.³³⁴ Although LTCF residents represent only 1% of the U.S. population, they represent 36% of U.S. deaths due to COVID-19.³³⁵ The disproportionate burden of deaths in LTCFs can be attributed to residents' unique susceptibility to COVID-19 and a lack of resources to mitigate the risks associated with the disease. Residents of LTCFs are often elderly with high rates of comorbid conditions that place them at risk for severe illness and death.^{336,337} Additionally, residents have repeated close contact with caregivers and visitors from the wider community, and share physical space and sources of air, food, and water with each other and community-based staff.³³⁸

This pandemic has also exposed underlying flaws in the LTCF system, including chronic underfinancing, insufficient healthcare services, and limited staffing. Even prior to the pandemic, infection control measures were poor in many LTCFs, with approximately 40% of Medicare (CMS) certified nursing facilities reported as deficient by state regulators.^{339,340} In response to these issues, CMS commissioned a 25 person independent panel to investigate safety in LTCFs during the COVID-19 pandemic, which provided recommendations on safety and quality improvement in September 2020.³⁴¹

Incarcerated Persons

With over 2.1 million people incarcerated in prisons or jails, the U.S. incarceration rate is the highest in the world (639 per 100,000 population as compared to

104 in Canada).³⁴² Nearly all of the 50 largest COVID-19 clusters in the U.S. have occurred in prisons and jails, and the number of reported cases in U.S. jails and prisons has exceeded 612,000 cases, with at least 2,700 deaths among both staff and the incarcerated.³⁴³ This tragedy has highlighted the importance of accelerating prison population reduction through release of incarcerated persons, investments in health and infrastructure, and prioritization of vaccines for prison residents and staff.

San Quentin California State Prison reported its first case of COVID-19 on May 30, 2020. Three weeks later, a team from the University of California, San Francisco and the University of California, Berkeley visited to assess vulnerabilities. The following day the team reported:

“San Quentin California State Prison is experiencing a rapidly evolving COVID-19 outbreak with profoundly inadequate resources to keep it from developing into a full-blown local epidemic and health care crisis in the prison and surrounding communities. The urgent resources San Quentin requires range from human capital to environmental risk reduction and rapid testing. Failure to meet these urgent needs will have dire implications for the health of people incarcerated at San Quentin, its staff, and the healthcare capacity of Bay Area hospitals.”³⁴⁴

The number of daily active cases in San Quentin peaked at 1635 at 38 days after the introduction of the virus in May, and this number did not return to zero until September 16, 2020.³⁴⁵ In total, 2,170 incarcerated people developed laboratory-confirmed COVID-19 infections during the summer outbreak.³⁴⁶

Primary Care Under Stress

COVID-19 also presented challenges for primary care. With new operational requirements to minimize infection risk, medical practices were forced to decrease in-person visits, change patient flow, buy additional PPE and shift to phone or video consultations. Primary

care visits dropped by 21% in the second quarter of 2020 compared to 2019.³⁴⁷ The long-term effects of these decreases are unclear. Delays in seeking preventive services, may lead to future increases in cancers, kidney disease and other detectable and/or preventable diseases.^{348,349}

Before the pandemic, 83 million Americans lived in areas with shortages of health professionals, including poor access to primary care physicians.³⁵⁰ A survey by the Physicians Foundation, found that approximately 8% of primary care practices closed across the U.S. in 2020, many in rural areas with already limited primary care capacity.^{351,352,353} Due to the fee-for-service U.S. payment system, a Harvard study estimates that \$15.1 billion could be lost by adult and pediatric primary care practices due to the pandemic, threatening the viability of many more primary care practices.³⁵⁴

Lack of access will be compounded by the extra burden that chronic post COVID-19 symptoms will likely place on the primary care system. Studies show that 10%–76% of patients report ongoing symptoms at 2 months after COVID-19 infection, with an unknown number developing long term disability from Long-COVID.^{355,356,357} With almost 30 million cases in the U.S at the time of writing, this could present major challenges for primary care practices, with patients requiring access for monitoring and treatment.³⁵⁸

Expansion of telehealth services has mitigated some of the negative consequences of access during the pandemic.³⁵⁹ Changes in reimbursement rules by Medicare, the public program for those over 65 years of age, and Medicaid, the public program for the poor, have allowed reimbursement for telehealth appointments at the same rate as in-person appointments.³⁶⁰

Human Resources for Health: Shortages, Attrition & Mental Health Impact

“Patients keep coming, and we have to take care of them regardless of our staffing levels. I worry that there is only so long staff can hold up before breaking.”

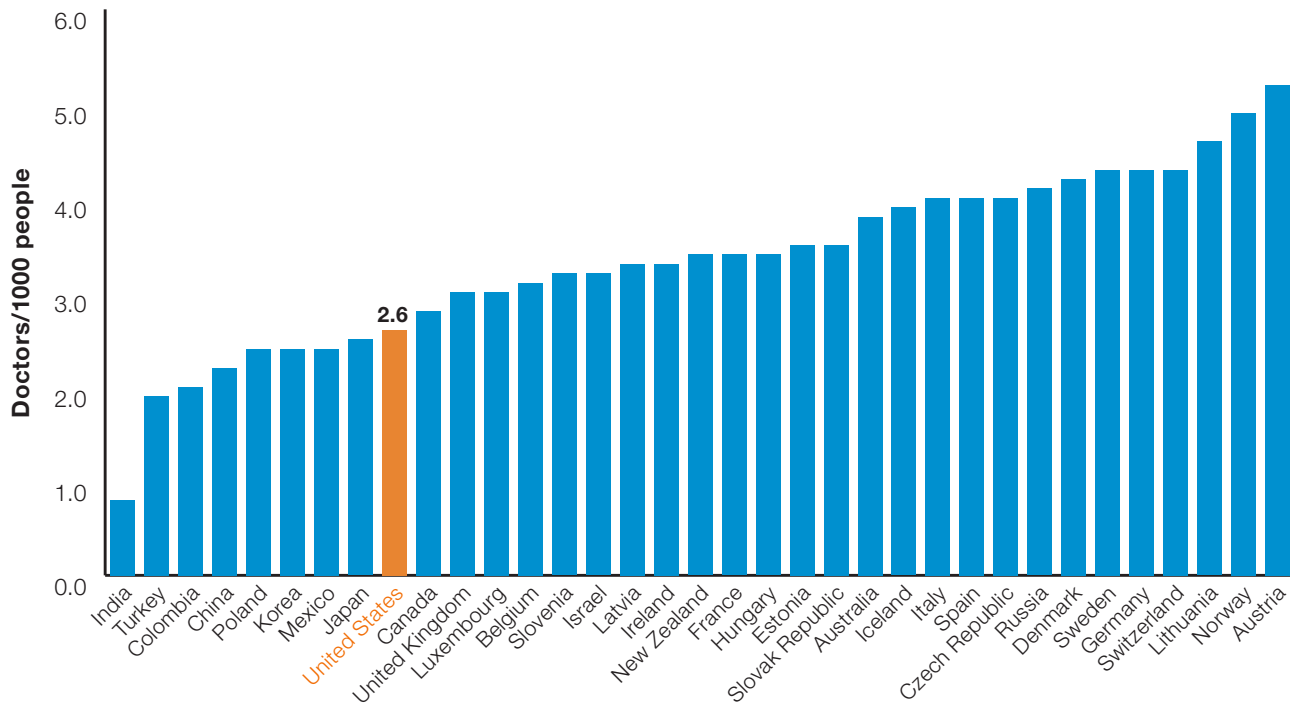
– *Gisella Thomas, respiratory therapist*³⁶¹

The U.S. has one of the lowest doctor to people ratios in the OECD at 2.6/1000 ([Figure 18](#)).³⁶² Thus, it is no surprise that hard-hit areas like New York faced alarming shortages of doctors, and other frontline personnel including respiratory therapists and nurses during surges.¹⁸⁷ Early in the pandemic when surges were concentrated on the east coast, thousands of healthcare professionals voluntarily flew to surge areas to support hospitals. Many hospitals also shifted outpatient or specialty providers into hospitalist or critical care roles, and in New York fourth year medical students were given the opportunity to graduate early and work as interns on medical wards.³⁶³ Community health workers and medical assistants took on essential, non-technical roles such as contact tracing, providing family updates, and supporting other patient social services. In subsequent surges many hospitals lowered nurse to patient staffing ratios (e.g. from 1:4 to 1:6 in California), doctor to patient ratios, and ratios for respiratory therapists.^{364,365}

But with surges taking place across the U.S., geographic redistribution of healthcare workers shifted from a volunteer model to a hospital bidding war, with some hospitals paying up to \$10,000 per week for nurses.³⁶⁶ This exacerbated inequities between regions, with affluent areas and wealthy hospitals ‘poaching’ nurses from rural areas and lower-resourced urban public hospitals.³⁶⁶

The U.S. has also seen high healthcare worker attrition rates over the course of the pandemic. Workers in hard-hit areas have fallen sick in record numbers. For instance, in December alone, 2,200 hospital workers in Los Angeles tested positive for COVID-19.³⁶⁷ Burnout, anxiety, fear, depression and post-traumatic stress among frontline healthcare workers from surges have led to additional attrition ([Box 9](#)).^{368,369}

Figure 18. Doctors/1000 people in OECD countries³⁶²



Data Source: OECD. Doctors (indicator). OECD Data. Organisation for Economic Co-operation and Development, 2019. Internet. Accessed 27 February 2021 at <https://data.oecd.org/healthres/doctors.html>.

Box 9: Reflections from an Infectious Diseases Fellow Physician in Texas, Daniel Maxwell, University of Texas, Southwestern

“I remember a young woman who had a cough in early 2020. Despite feeling ill, she kept caring for her elderly mother. Her mother ended up admitted to our ICU with respiratory failure from COVID-19. As I was discussing her mother’s condition, the young woman’s shaking voice kept repeating the same refrain: “I didn’t know it was this serious, I didn’t know.” It was as if she were pleading for a pardon, trying to convince a court that her crime was only ignorance, not malevolence. Her mother died some days later, separated from her distraught daughter.

This tragedy has been repeated to me, and thousands of other healthcare workers, too many times to count

over the past year. As numbers climbed, how did the destruction this virus can cause continue to surprise everyone? How did it still catch almost each and every family unaware? The painful realization that this pandemic is deadly still occurs far too late for far too many. Though this disease has done much already to drive home its bitter lessons, such crises will inevitably face us again, and it is my hope that we can all learn faster the next time around. As Osler said:

“The value of experience is not in seeing much, but in seeing wisely.”

Essential Supplies for the Healthcare System

At the start of the U.S. epidemic, the country struggled to ensure adequate supplies. The Strategic National Stockpile, which contains emergency supplies to be used by states during epidemics was depleted during the 2009 H1N1 influenza pandemic and never replenished. The Stockpile, which once held more than a hundred million N95 masks, only had twelve to thirty million masks for the first surge.^{320,370,371} Early in the pandemic, the Speaker of the House and the president of the American Medical Association called unsuccessfully for invocation of the Defense Production Act,^{372,373,374} which would force and incentivize private companies to scale up production of medical supplies. As mentioned above, this Act was not invoked by the President until the end of March. Responsibility for distribution and procurement of PPE was delegated to the states and the private sector, without federal guidance or coordination.³⁷⁵

The PPE shortage unmasked U.S. over-dependence on globally sourced medical supplies. As the world's single largest importer of face masks (33.8% of global supply in 2019), the country was hit particularly hard when China stopped exporting PPE and instead started purchasing from the global supply, initiating a cascade of export restrictions across many countries.³⁷⁶ This increased the price of surgical masks six-fold and the price of N95 masks three-fold.³⁷⁷ In the meantime, due to poor coordination, the U.S. continued to export its PPE until April despite known in-country needs, exacerbating domestic shortages.³⁷⁶ In certain parts of the country, creative strategies to accelerate alternate production, such as technology companies using 3D printing of masks, helped soften the blow of shortages (Box 10).³⁷⁸ Despite these efforts supply-demand mismatches continued until the late fall of 2020.

Box 10: The Private Sector – the COVID-19 Healthcare Coalition

The COVID-19 Healthcare Coalition is a U.S.-based private sector platform that leverages technology companies, private healthcare, nonprofit organizations, academics and start-ups to support the COVID-19 response. The coalition has over 900 member organizations, including Amazon, Box, Deloitte, Google, Microsoft, Salesforce, Tableau, Acumen, MIT, Teladoc, Boston Medical Center, and many others. The Coalition's work spans multiple projects, including support for improved supply chains and development of demand allocation models for PPE; support for new PPE technologies; real-time tracking of statewide non-pharmaceutical intervention (NPI) implementation; creation of a policy decision support dashboard; and development of data-driven clinical insights and protocols.³⁷⁹

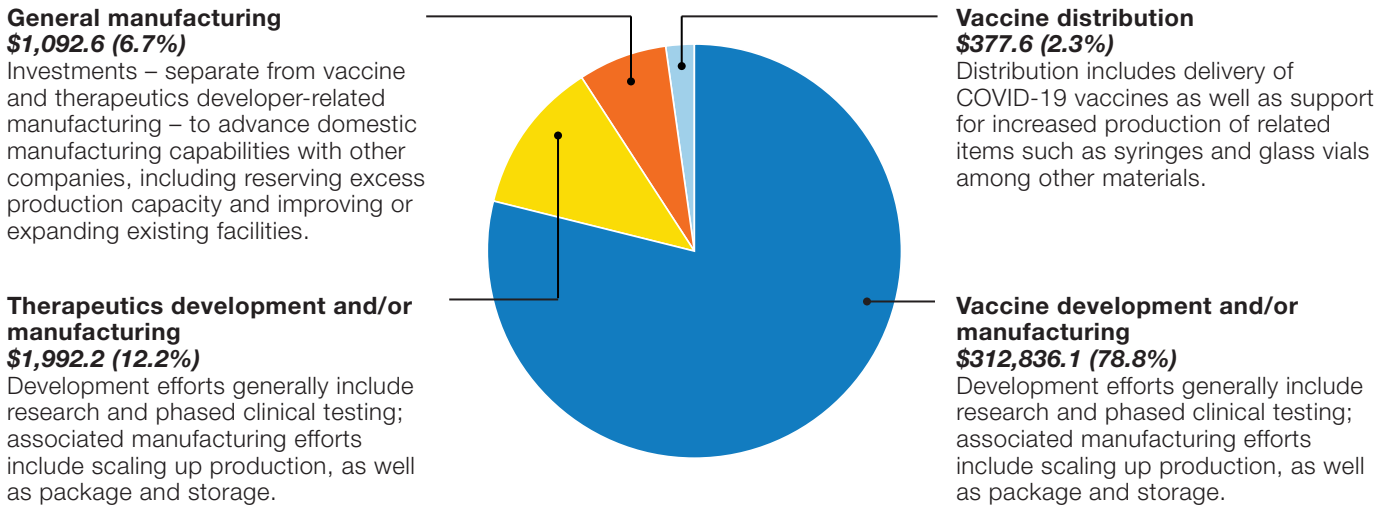
Vaccine Deployment: an Operational Challenge

Despite incredible success in vaccine development (described in the following chapter), inadequate logistical planning and a lack of financial support for states beleaguered the initial COVID-19 vaccination campaign, leading to sluggish delivery and inequitable distribution.

Operation Warp Speed (OWS), through the U.S. Department of Defense, was tasked with supporting both development and rapid deployment of vaccines.³⁸⁰ In September 2020, the Trump administration promised to have 100 million vaccination doses distributed by the end of the year with at least 20 million people vaccinated.³⁸¹ By December 31, 2020, only 14 million doses had been distributed and 2.8 million people had been vaccinated, well short of promises.²²⁵

OWS limited its remit to acquiring and allocating vaccines, leaving states to develop their own delivery mechanisms.^{381,382} Monies allocated for vaccine distribution were also grossly inadequate at only 2.3% of total OWS funding (Figure 20).³⁸³

Figure 19. Allocation of money for Operation Warp Speed³⁸³

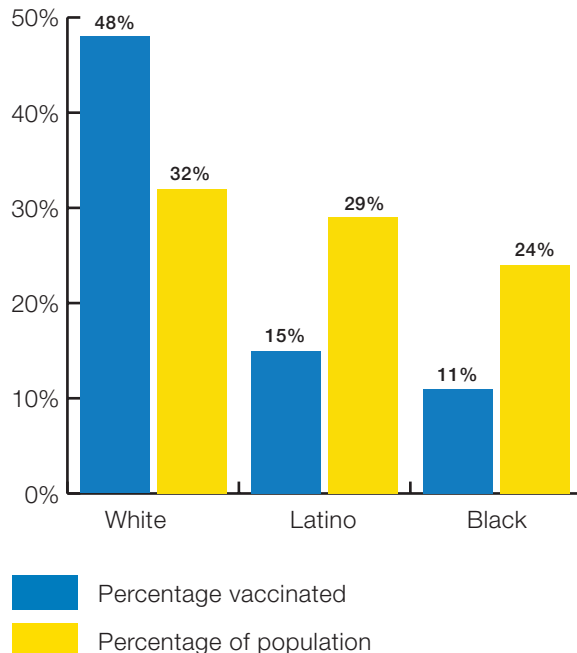


Source: Allocation of money for Operation Warp Speed. Reprinted from the Analysis of Federal Procurement Data by the Government Accountability Office, 2020, retrieved from <https://www.gao.gov/assets/gao-21-207.pdf>. Copyright 2020 by the Government Accountability Office. Reprinted with permission.

State and local governments, many lacking money and operational capacity, were unequipped to administer population wide vaccination campaigns.³⁸⁴ This resulted in reliance on hospitals, clinics and private pharmacies to deliver vaccinations. Initial CDC prioritization guidance was overly complicated, with a tiered system that involved multiple layers and phases and was difficult, if not impossible, for most states to implement. States responded by defining their own priority groupings, causing considerable confusion among the public.³⁸⁵ The hundreds of public and private organizations tasked with vaccine distribution developed widely discordant and often inequitable distribution plans,³⁸⁶ leading to inequities by race and ethnic group.^{387,388}

Equitable allocation of vaccines remains a challenge. Though national data on race are limited (as of January 21, 2021, only 17 states were reporting vaccination rates by race), early surveys indicate that racial groups at highest risk for COVID-19 infection have some of the lowest vaccination rates.³⁸⁹ For instance, in New York, only 11% of those vaccinated are Black and 15% are Latinx, despite representing 24% and 29% of the population respectively (Figure 20).^{389,390} Equity concerns transcend race, with poor access reported in rural areas, for home-bound individuals with disabilities, undocumented immigrants, and the elderly, all of whom have difficulty navigating digital vaccine scheduling systems.^{391,392}

Figure 20. Disparities in vaccine administration in New York City, January 2021³⁹⁰



Source: New York City Health. COVID-19 Vaccine Tracker. NYC Health Data Set. New York City Department of Public Health, 2021. Internet. Accessed 8 February 2021 at <https://www1.nyc.gov/site/doh/covid/covid-19-data-vaccines.page>.

As we write this report, there remains a lack of clarity for the public around how, when and where to get vaccinated. Scheduling vaccine appointments has been difficult in most states, with poorly designed online and phone scheduling systems and long waiting times.³⁹³ A successful vaccination campaign also requires public trust and a willingness to receive the vaccine. In the context of historical injustices by the U.S. medical community, vaccine hesitancy among marginalized groups remains high, with 35% of Black Americans saying they would definitely not or probably not get vaccinated.²⁹³ Surveys of Latinx communities indicate similar, though slightly lower, levels of vaccine hesitancy, with many voicing concerns that the vaccine is unsafe or ineffective.³⁹⁴ With minimal data on immigrant populations, there are concerns that undocumented immigrants will avoid vaccination out of fear of deportation.³⁹⁵ Public health leaders have called for greater investment in communication and trust-building in these communities to improve vaccination rates.³⁹⁶ This includes community engagement by prominent Black and Latinx physicians and scientists for building trust within ethnic communities.³⁹⁷

At the time of writing, the Biden administration has pledged billions of dollars for vaccine supply and rollout, with an additional 200 million doses procured on behalf of states on January 26, 2021, and states reporting dramatic improvements in delivery.³⁹⁸

Investing in Global Immunologic Equity

“The coming year could be a story of two worlds undermining each other. Certain countries will approach herd immunity by vaccinating almost every citizen. Other countries could see mass casualties and catastrophic waves of reinfection—potentially with variants that evolved in response to the immunity conferred by the very vaccines to which these populations do not have access. In the process, these hot spots themselves will facilitate rapid evolution, giving rise to even more variants that could make the vaccinated populations

susceptible to disease once again. In a recursive loop, the virus could come back to haunt the vaccinated, leading to new surges and lockdowns in coming years. The countries that hoard the vaccine without a plan to help others do so at their own peril.”

– James Hamblin, *journalist & physician*³⁹⁹

The U.S. will not be safe from COVID-19 until all countries are safe. The pandemic represents a global security threat that requires a global commitment to immunologic equity. The WHO has proposed plans for equitable global distribution through flexible governance, adequate financing, and evidence-based, collaborative distribution plans.^{58,400,401} However, vaccine nationalism threatens equitable allocation to less wealthy countries. Many high-income countries are buying large quantities of vaccines and are prioritizing vaccinating their own populations.⁴⁰²

This nationalistic behavior, without significant reciprocal commitments to vaccine equity, will cause large disparities in access for half or more of the world’s population. The Economist Intelligence Unit estimates that many low- and middle-income countries will not have widespread vaccination coverage until 2023 (Figure 21).⁴⁰³

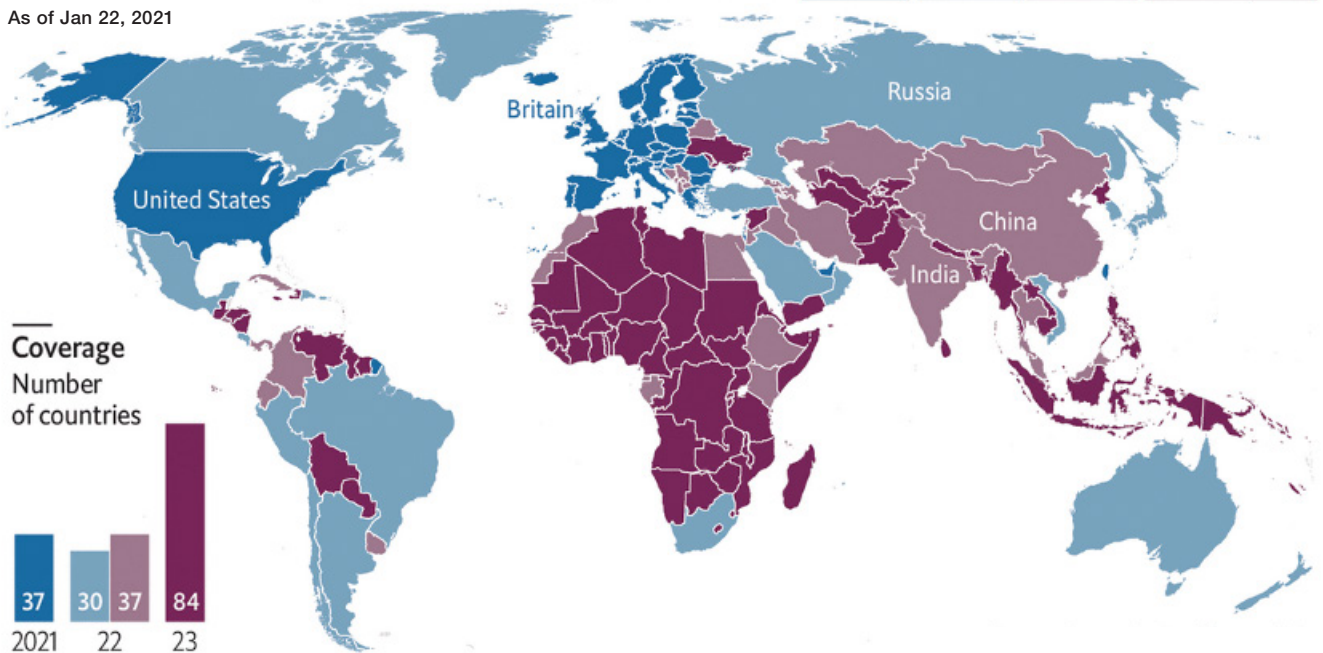
By January 26, 2021 only one of the poorest 29 countries had begun vaccinating its people.⁴⁰⁴ Proportional distribution of vaccines may save nearly twice as many lives globally as inequitable distribution⁴⁰⁵ and failure to do so could cost over \$1.2 trillion per year to the global economy.⁴⁰⁶ In addition, leaving large numbers of people unvaccinated may promote the evolution of more lethal and potentially vaccine-resistant variants.

Figure 21. Predicted vaccination coverage by country⁴⁰³

Covid-19, when will widespread vaccination coverage be achieved?

Late 2021 Mid 2022 Late 2022 from early 2023

As of Jan 22, 2021



Source: Predicted vaccination coverage by country. Reprinted from *The Economist* by the Economic Intelligence Unit, 2021, retrieved from <https://www.economist.com/graphic-detail/2021/01/28/vaccine-nationalism-means-that-poor-countries-will-be-left-behind>. Copyright 2021 by the Economist. Reprinted with permission.

Chapter 8: Scientific Innovation

“I think we can see light at the end of the tunnel. I believe [the COVID-19 vaccine] is likely the most significant medical advance in the last 100 years, if you count the impact this will have in public health [and the] global economy.”

– Dr. Albert Bourla, Pfizer Chairman and CEO⁴⁰⁷

Effective pandemic response requires coordination, collaboration and rapid information exchange among scientists, clinicians and public health practitioners. The U.S. has a robust biomedical innovation ecosystem that was quickly activated to develop novel diagnostics, therapeutics and vaccines. The joint efforts of academics, government scientists, and biotechnology and pharmaceutical companies, have advanced research on SARS-CoV-2 immunology, virology, molecular biology, epidemiology, pathophysiology and treatment.

This chapter is devoted to the United States’ role in scientific innovation for COVID-19 vaccines, therapeutics, and diagnostics, and briefly summarizes relevant basic science research and clinical advances.

Research and Development

The Vaccine Success

The most notable success in the U.S. pandemic response has been strong private industry and government collaboration to accelerate the discovery of COVID-19 vaccines. Government officials and scientists recognized the critical role vaccines would play in mitigating the pandemic and pushed to create OWS, a multi-billion dollar public-private partnership led by the Department of Health and Human Services.⁴⁰⁸ Initially funded with \$10 billion dollars from the Coronavirus Aid, Relief, and Economic Security Act, OWS was subsequently allocated an additional \$8 billion dollars in October 2020.^{113,409} OWS funds HHS-wide activities, including the National Institutes of Health ACTIV vaccine and therapeutic development partnership, the Rapid Acceleration of Diagnostics (RADx) initiative, and the activities of the Biomedical Advanced Research and Development Authority (BARDA).⁴¹⁰

The great majority of this funding has been allocated to vaccine development and manufacturing, and particularly to six vaccine candidates.⁴¹¹ The government has also used the OWS mechanism to fund large advance-purchase agreements via a non-governmental intermediary with all six vaccine companies.^{412,413,414}

The development of the Moderna and Pfizer-BioNTech (a U.S.-German collaboration) messenger ribonucleic acid (mRNA) vaccines in less than a year from initial characterization of SARS-CoV-2 is an outstanding scientific achievement. Although mRNA technology was developed in the 1990’s, it was only recently that major research investments and technological innovations have made mRNA vaccines viable.⁴¹⁵ Both COVID-19 mRNA candidates significantly outpaced development expectations, with impressive efficacy of greater than 94%.^{416,417} Lessons from the COVID-19 vaccine development process, particularly advances in new mRNA and recombinant protein technology, have the potential for broad impact both on COVID-19 and the prevention of future emerging infectious diseases.⁴¹⁸

The FDA has played a key role in accelerating COVID-19 vaccine authorization. Despite political interference and pressure from the administration to authorize a vaccine quickly, the FDA maintained stringent requirements to ensure safety and efficacy of vaccine candidates and conducted its own analysis of the entire data set from clinical trials.⁴¹⁹ Typically, scientific and regulatory processes required to authorize and approve novel drugs and vaccines can take years, but the FDA was able to rapidly evaluate the vaccines using concurrent assessments by FDA scientists and an independent advisory panel. The advisory panel deliberations were live-streamed online, ensuring full transparency of the evaluation process. This assessment of the trial data led to quick consensus on safety and efficacy, with endorsement by the independent advisory panel expediting Emergency Use Authorization by the FDA.^{420,421}

Therapeutics: an Ongoing Need

With thousands of daily infections, new therapeutics are urgently needed for COVID-19 treatment and prophylaxis.⁴²² By October 31, OWS had committed

only \$2.8 billion to therapeutics compared to \$13.3 billion for vaccines.⁴¹²

These investments have largely supported private sector research on a select number of highly technical therapeutic agents, notably monoclonal antibodies, immune globulin and convalescent plasma.⁴²³ Overall, there has been a noticeable lack of early investment in novel antivirals, outside of a handful of private sector companies.⁴²⁴

Private pharmaceutical companies, rather than government labs, have developed most of the advanced novel drugs in the research and development pipeline, including small molecule agents and monoclonal antibodies.⁴²⁵ Additionally, in collaboration with academic institutions, hundreds of private companies are screening therapeutic compound libraries and conducting clinical trials to identify potential new agents to treat COVID-19.^{424,426} For example, remdesivir, an antiviral drug developed by Gilead Sciences for Ebola, was repurposed for COVID-19 after promising in vitro studies and has shown positive effect in large randomized controlled trials in the U.S.⁴²⁶

The absence of a large coordinated national clinical trial infrastructure for COVID-19 in the U.S. has posed challenges to the rapid evaluation of repurposed drugs and novel therapeutics. Despite hundreds of ongoing clinical trials at various academic centers, hospitals, clinics and long-term care facilities across the country, many trials are not adequately designed or powered, and have therefore produced few actionable results. And despite millions of COVID-19 patients across the U.S., many clinical trials have struggled to recruit enough subjects as the pandemic has waxed and waned in individual regions.⁴²⁷

Diagnostic Technology

The early CDC diagnostic testing failure is described above. However, private laboratories, industry, and academic researchers across the U.S. have led extensive efforts to develop new assays and platforms, a testament to American innovation. It was not until late February, when severe national test kit shortages and data backlogs became apparent, that the FDA permitted academic and private laboratories to begin producing COVID-19 test kits.⁴²⁸ These groups have now developed a variety of serologic, molecular and antigen tests, including rapid diagnostic tests and new home-based antigen tests.^{418,429} Additionally, BARDA's Medical Countermeasure Portfolio has supported a number of public-private partnerships for diagnostic test development.⁴²³ Similarly, the National Institutes for Health (NIH) invested approximately \$200 million dollars in industry for new testing technology through its RADx initiative.⁴³⁰

Unfortunately, expedited approval of some diagnostic tests has led to poor quality control. In March 2020, the FDA allowed test developers to market and sell validated serological test kits without Emergency Use Authorization. The developer was required to submit details on their test to the FDA and to alert patients that the test had not been formally approved by the FDA. While this was intended to facilitate access to serological testing, poorly developed tests flooded the market and many companies failed to indicate test limitations to patients. Since then, the FDA has received notice of numerous violations of FDA policy, and 225 listings of new tests have been removed from its website.⁴³¹

Basic Science & Clinical Innovation

As COVID-19 emerged in the U.S., the scientific and medical communities activated to leverage pre-existing cross-country collaborations. Industry, government, academic and community scientists and clinicians developed informal online networks for information sharing,^{432,433,434} accelerating COVID-19 basic science and clinical research.⁴³⁵

Within the U.S., major medical associations and individual physicians, nurses, respiratory therapists and pharmacists created formal and informal networks for information sharing. For example, the Infectious Diseases Society of America developed a real-time learning network for clinicians, with weekly conferences to update healthcare workers on emerging clinical trends.⁴³⁶ Healthcare workers, basic scientists and epidemiologists leveraged open-source Google documents and social media platforms to disseminate and discuss new research, clinical cases, infection prevention and control measures and epidemiologic trends.⁴³⁷ Academic institutions developed open-source websites, such as the Brigham and Women's Hospital's covidprotocols.org and the UC San Francisco opencriticalcare.org, to ensure physicians in non-academic and rural hospitals had access to synthesized research and clinical recommendations.^{438,439} Many academic centers have also committed to broadly sharing expertise through virtual conferences and presentations^{438,440,441} and have developed free COVID-19 training programs to support clinician education.⁴⁴²

Global Health Security Research

U.S. scientists have been at the forefront of research on emerging pathogens with pandemic potential. The CDC's Division of High-Consequence Pathogens and Pathology, the National Science Foundation's Global Health Security program, U.S. Department of Agriculture animal disease monitoring programs, and academic researchers and non-profit organizations

have contributed to global knowledge on emerging infectious disease threats.

A majority of novel emerging diseases in the twenty-first century are zoonotic.⁴⁴³ Rapid population growth coupled with human encroachment on animal habitats will inevitably lead to new epidemics. A recent study notes that emergence of SARS-CoV-1 and 2 may have been a consequence of shifting bat ecosystems resulting from global climate change.⁴⁴⁴ The USAID Emerging Pandemic Threats program supports global research on emerging pathogens. The PREDICT project, a government-academic partnership focused on leveraging collaborations to detect, diagnose, and respond to epidemic threats.⁴⁴³ PREDICT, a part of USAID's program, was initiated in 2009 and utilized a One Health approach that highlighted the link between human and animal health in the context of a shared environment. The PREDICT project strengthened surveillance for and identification of viruses emerging at high-risk human-animal interfaces.⁴⁴⁵ Across a

network of partners in 36 countries, PREDICT trained a One Health workforce of over 6,000 professionals in more than 30 countries, strengthened zoonotic disease detection capabilities in 67 laboratories, and sampled more than 160,000 animals and humans to conduct surveillance for spillover of zoonotic viruses.²⁸⁷ Through this process, over 1,100 unique viruses were detected, including 177 coronaviruses, 64 of which were known and 113 of which were previously unknown.²⁸⁷ The PREDICT program was discontinued by the Trump Administration in September 2019, with the project slated to conclude in March of 2020. In light of the pandemic, a \$2.26 million project extension was granted to continue work until September 2020, at which time the program was discontinued.²⁸⁷

Unfortunately, cuts to global health and pandemic prevention research have been particularly severe in recent years.⁴⁴⁶ As climate change accelerates and new zoonotic diseases emerge, ongoing research will be critical to preventing future epidemics and pandemics.^{444,447}

Chapter 10: Conclusions and Recommendations

“It’s time for boldness, for there is so much to do.”

– President Joe Biden, January 20, 2021⁴⁴⁸

In this chapter we highlight eight key conclusions and associated recommendations, to address the COVID-19 pandemic, and to ensure that the U.S. is better prepared for the next one.

Conclusion #1

The United States lacked effective political leadership in its COVID-19 response at the federal level. Leadership at subnational levels was highly variable.

Leadership is essential to mobilize and coordinate a massive response to a public health emergency, to gain popular acceptance of government policies and recommendations, and to inform and motivate individual behavior. Leadership failures can result either from weak and ineffectual leadership, or from leadership that is strong and influential but counterproductive. The U.S. experienced both.

The Trump administration made decisions that undermined the U.S. response, including articulating misinformation, repeatedly minimizing the seriousness of the pandemic and undermining science, while sidelining experts at public health and scientific agencies. It promoted a false choice between protecting the economy or saving lives, encouraging state leaders to relax control measures without strong prevention plans in place.

Many leaders flaunted their disregard for common sense public health interventions such as mask wearing and social distancing, thereby politicizing highly effective, low-cost measures that could have saved thousands of lives.

Key Recommendations

A. FOR COVID-19 RESPONSE

- The federal government should promote effective collaboration between federal, state and local agencies, clearly defining roles and responsibilities at each level.

- The federal government should ensure there is a fully staffed National Security Council Directorate for Global Health Security and Biodefense.

B. FOR PREPAREDNESS

- Congress should enact legislation to authorize emergency powers to mobilize a rapid, coordinated federally-led response during public health emergencies. This national architecture should protect against political interference.

Learning from the SARS outbreak, many East Asian countries enacted legislation granting emergency powers for a centralized infrastructure that could be rapidly deployed in times of public health emergencies. The excellent performance of these countries during the COVID-19 pandemic attests to the success of this infrastructure. Certain aspects of the East Asian model may not be culturally or politically appropriate in the U.S., but legislation can be crafted, which reflects the nation’s culture, and federalist political structure.

- The U.S. should create an apolitical architecture for key public health institutions such as the Centers for Disease Control and Prevention, and the Food and Drug Administration. The Federal Reserve may provide a useful model for consideration.

Conclusion #2

The United States failed to act early and decisively in combating the virus. Critical delays and poorly executed basic public health interventions, compounded by chronic underinvestment in public health, were key contributors to the staggering number of cases and deaths in the U.S. The underinvestment in public health continued in 2020 with only 1.6% of Congressional emergency appropriations targeted for public health activities.

Basic public health measures such as testing, contact tracing, supported isolation and quarantining, mask wearing and social distancing, were either implemented inconsistently, not at all, or too little and too late.

Significant delays and failures in testing early in the pandemic allowed the virus to spread undetected through the population. One year into the pandemic, widespread community surveillance has not materialized, with the U.S. still experiencing problems with availability and access to testing, and delays in test results.

The lack of national public health leadership in this pandemic allowed states, counties, and cities to pursue widely divergent approaches, creating a patchwork of conflicting policies and guidance. The absence of clear public health strategies and messaging led to public confusion and allowed an info-demic of dis- and misinformation.

Coupled with the issues noted above, systemic under-investment in the public health infrastructure, including linked data systems and standards, crippled state and local surveillance, and implementation of public health interventions.

Key Recommendations

A. FOR COVID-19 RESPONSE

- Congress should appropriate substantial additional monies for pandemic control, including for widespread community surveillance, rapid antigen testing, supportive isolation and quarantine, genomic surveillance, and vaccine roll-out.
- The federal government should create a robust testing infrastructure with targets and strategies to rapidly scale-up public health surveillance of the virus. A public-private testing consortium, such as the CDL Rapid Testing Consortium in Canada, should be evaluated for deployment in the U.S.
- Working with state and local governments, mask mandates should be expanded, accompanied by public health messaging to promote the importance of mask wearing.
- The U.S. should prioritize investments in safe re-opening of schools and childcare facilities. Regular surveillance testing in schools should be operationalized by implementing centralized purchasing, building improved data systems, and instituting comprehensive weekly or biweekly antigen testing. Teachers and staff should be given priority for vaccinations. The government should also allocate funding for infrastructure improvements, including for effective ventilation systems in these facilities.
- The U.S. should invest in supportive isolation and quarantine programs which provide financial and social support to those who are infected or have been in contact with an infected person. These should include options for conditional cash transfers as needed, paid institutional isolation, and direct economic relief for workers lacking employment protections.

B. FOR PREPAREDNESS

- The federal government should invest in a Public Health Infrastructure Fund to:
 - » Modernize the public health information technology infrastructure at federal, state, tribal, and local levels, enabling a coordinated, rapid response in public health emergencies. Partnerships with the private sector should be pursued to implement these much-needed upgrades to the public health infrastructure.
 - » Strengthen public health capacity to develop and deploy basic public health measures at scale, including testing, contact tracing, supported isolation and quarantine, guidance on non-pharmaceutical interventions, and genomic surveillance.
- The U.S. should launch a public messaging campaign to prepare the American people for the possibility of another pandemic during their lifetime. This should include public education on the need for emergency powers that may impact individual freedoms, and the importance of compliance during public health emergencies.

Conclusion #3

Immigrant, Black, Latinx, American Indian and Alaska Native communities, and those living in poverty, have suffered disproportionately from the COVID-19 pandemic.

Longstanding social, health and economic inequities, fueled by systemic underinvestment and racism, have been exacerbated by the virus. Historically disadvantaged communities have experienced higher incidence and worse health outcomes from COVID-19, with mortality rates in American Indians/Alaska Natives, Black and Latinx Americans between 2.6 and 2.8 times higher than White Americans. Minority communities experience high rates of comorbid conditions due to health and social disparities, also worsening COVID-19 outcomes. Many live in crowded multigenerational homes, which efficiently fuel viral transmission.

Poverty and occupational hazards are also more pronounced for people of color and immigrants, with many employed at low paying essential jobs, such as factory work or grocery stores, placing them at higher risk of infection. Lacking employment benefits and protections, isolating and quarantining become financially infeasible.

Key Recommendations

A. FOR COVID-19 RESPONSE

- The federal government should invest in targeted programs to protect the hardest hit groups including communities of color, and low-income, incarcerated, institutionalized, homeless, and immigrant communities.
- Federal and local public health agencies, in partnership with community leaders should create culturally competent public health messaging to promote testing, vaccination, and compliance with public health orders, such as mask wearing and social distancing.
- The U.S. should make COVID-19 testing, treatment, and vaccination free of charge to everyone, regardless of immigration status. The U.S. should create Testing and Treatment Safe Havens for undocumented workers, providing protections against deportation.
- All states should be required to report public health interventions including testing and vaccinations by racial and ethnic group.

B. FOR PREPAREDNESS

- The U.S. must substantially increase its investments to flatten the curve of racial and ethnic disparities in health. This includes increasing access to testing facilities, expanding healthcare coverage and access, strengthening worker protections and sick leave benefits, providing nutritional and housing options, and bolstering the social safety net to build community resilience.

Conclusion #4

The structure of the United States health system is fundamentally ill-suited to mounting an effective, coordinated response to a pandemic.

Despite spending much more on healthcare than any other country in the world, the U.S. reliance on fragmented employment-based private health insurance, and lack of universal health coverage severely compromised its ability to respond to COVID-19. Hospitals were forced to limit access to insured non-COVID-19 patients, threatening their financial solvency; while insurers debated whether the costs of testing were their responsibility or the responsibility of public health departments.

Beyond coverage for SARS-CoV-2, massive job losses meant that an estimated 2–3 million Americans may have lost their health coverage. Delays in transitioning to Medicaid, and existing coverage gaps reduced access to health services, and have potentially left many

families facing medical impoverishment. Immigrants, a third of whom lack any health coverage, suffered disproportionately.

Key Recommendations

A. FOR COVID-19 RESPONSE

- Rules for COVID-19 coverage under public programs (e.g. Medicaid) should be more flexible with less restrictive testing requirements and should provide full payment for acute treatment as well as for short and long-term post-COVID-19 disability. Public programs should guarantee financial protection against medical impoverishment for those affected.
- For those who are ineligible for Medicaid, the federal government should increase its premium tax credit or provide direct subsidies to support transition to coverage options under federal and state insurance exchanges. It should require continuity of coverage policies, payment grace periods, and open enrollment in these plans for the duration of the pandemic.

B. FOR PREPAREDNESS

- The federal government should provide strong financial incentives to expand Medicaid coverage in the 12 states, which have not done so already. Federal monies should require states to ensure that expanded Medicaid eligibility addresses the chronic gaps in coverage faced by millions.
- The U.S. needs to make a commitment to provide funding to move towards affordable, quality, universal health coverage for everyone.

Conclusion #5

Hospitals in the United States were unprepared to cope with the high influx of COVID-19 patients.

At varying times in the pandemic, hospitals and clinics faced critical supply shortages, including for personal protective equipment and ventilators. The under-resourced Strategic National Stockpile left states and individual hospitals to compete with each other for essential supplies.

Intensive care and acute care beds were filled to 95% occupancy during surges in many areas, limiting access for both COVID-19 patients, and for those with other urgent medical needs. Healthcare worker capacity was severely stretched during surges.

Rolling cancellations of elective surgeries have caused financial hardship for rural hospitals and federally qualified health centers.

Primary care access has been reduced in many areas, with limited availability for in-person appointments, lack of follow-up for chronic illnesses, and delayed childhood immunizations. Medicare and commercial insurers have attempted to address these issues by allowing reimbursement of telehealth consultations, ameliorating access problems for some Americans.

Key Recommendations

A. FOR COVID-19 RESPONSE

- The federal government should provide emergency subsidies for federally qualified health centers and under-resourced hospitals, particularly those in rural areas that are buckling under the financial strain caused by the COVID-19 pandemic.

B. FOR PREPAREDNESS

- The federal government should continually replenish the Strategic National Stockpile, and expand inventory lists to ensure rapid response to novel pathogens.
- Domestic supply chains should be strengthened with better coordination among states to prevent competition for critical supplies. The federal government, on behalf of states, should leverage its significant buying power to negotiate with suppliers for essential medical supplies.
- The federal government should invoke the Defense Production Act early in any potential public health emergency.
- Accreditation and licensure agencies should require robust disaster contingency planning for worst case novel pathogen scenarios for hospitals and health facilities.

Conclusion #6

The United States commitment to vaccine development has been a defining success. Slow initial rollout and the absence of a coordinated national vaccination strategy threatened to overshadow this singular achievement.

The U.S. excelled in its investment to develop novel vaccines and therapeutics for COVID-19. Operation Warp Speed, an \$18 billion dollar public-private partnership led by the Department of Health and Human Services, supported development and manufacturing of multiple vaccine candidates and R&D for therapeutic agents and diagnostic tests. It also acted as the framework for advance purchase agreements with vaccine producers.

Despite incredible success in vaccine development, the federal government failed to invest adequately in vaccine delivery. Inadequate logistical planning, and lack

of financial support for state, and local vaccine roll-out, beleaguered the initial COVID-19 vaccination campaign, leading to sluggish deployment and inequitable distribution. Steps to remedy this have been taken by the Biden administration.

Key Recommendations

A. FOR COVID-19 RESPONSE

- The U.S. needs a coordinated and well-funded federal plan for vaccine distribution. The new administration has proposed legislation for investments in critical vaccine infrastructure, including centralized procurement of vaccine doses from manufacturers, development of allocation and delivery dashboards, and support for large and efficient vaccination centers.
- The U.S. must invest in vaccine equity across historically disadvantaged groups. This should include health promotion campaigns led by community leaders to allay fears and overcome high levels of vaccine hesitancy among some of these communities.
- The U.S. should continue to incentivize companies to develop improved vaccines for COVID-19, ensuring cheaper and easier access by eliminating the need for cold storage and two-dose schedules.

B. FOR PREPAREDNESS

- The federal government should support public-private partnerships to develop universal influenza and coronavirus vaccines and therapeutics.
- Learning from the success of Operation Warp Speed, federal agencies should re-engineer their processes for faster approval of new vaccines and therapeutics while safeguarding the quality of approved products.

Conclusion #7

Record levels of federal spending to support families and businesses have been effective in protecting many Americans from serious economic shocks. However, more must be done to ensure continued recovery.

The U.S. provided unprecedented fiscal relief to businesses and families through five major congressional actions in 2020, totaling 18% of U.S. GDP. As large as these additional monies were, they paled in comparison to other wealthy economies, such as Germany, which spent more than 35% of its GDP on economic relief, while having a much stronger social safety net.⁴⁴⁹

The pandemic has laid bare long-standing deficiencies in the way the U.S. finances its social safety net

including funding for state and local governments, health coverage, unemployment insurance, and sick leave.

Key Recommendations

A. FOR COVID-19 RESPONSE

- The federal government should continue to provide targeted relief to small businesses and individuals who have experienced economic hardship as a result of the pandemic.
- The federal government should provide financial support to state and local governments to ensure continued employment of teachers, public health professionals, police, corrections officers, and other public servants.

B. FOR PREPAREDNESS

- The U.S. should develop a clear long-term agenda to strengthen its social safety net.
- The federal government should support reducing the variability among states and between ethnic groups in access to basic health and social services.

Conclusion #8

The United States will not be safe from COVID-19 until all countries are safe. Pandemics represent a global security threat that requires a global commitment to immunologic equity. To prevent the scale of suffering inflicted by this pandemic, the world needs a strengthened global architecture for pandemic preparedness and response.

SARS-CoV-2 variants are emerging and proliferating worldwide. Despite travel restrictions, porous borders mean the rapid spread of new variants. Vaccine resistant or more lethal forms of SARS-CoV-2 may emerge without effective mitigation strategies to control them. Containing the pandemic will require multilateral collaboration and a commitment from wealthy countries to support less wealthy nations in eliminating COVID-19.

While Russia and China have made their vaccines available to lower income countries, vaccine nationalism has been on display across the U.S., U.K. and Europe, which bought large supplies of vaccines through advance purchase agreements. Because of

advance purchases by wealthy countries, even a nation such as Argentina, which was a clinical trial site for Pfizer, is unable to procure the Pfizer vaccine for its population.⁴⁵⁰ According to the WHO, as of January 21, 2021 Guinea had vaccinated only 25 people compared to almost 28 million in the U.S.⁴⁵¹

Collaboration and trust among countries is a necessary condition for success in fighting this pandemic and preparing for the next one. This might appear to be a major stumbling block in today's geopolitical environment. However, the devastating impact of COVID-19 on all communities and all countries, and the universal commitment to never let this happen again, provides a shared purpose and agenda for transformational change in global collective action.

Key Recommendations

A. FOR COVID-19 RESPONSE

- The U.S. must commit to global immunologic equity with active participation and commensurate funding. This includes supporting the creation of a vaccine infrastructure for developing, manufacturing and delivering easy-to-use vaccines in low resource settings. The U.S. should provide ongoing financial commitments to the Access to COVID-19 Tools Accelerator (ACT-A) COVAX initiative to ensure adequate vaccine supply for low and lower-middle income countries.
- The U.S. government should invest in the other ACT-A pillars, including therapeutics and diagnostics, to support multi-pronged country responses around the world.

B. FOR PREPAREDNESS

- The U.S. should actively participate in developing and funding a strengthened global health architecture for pandemic preparedness and response. The new U.S. administration has a once in a generation opportunity to seize this moment and work with other countries to create a new era of global health security.
- The U.S. should provide funding for a multidisciplinary One Health approach, including bio-surveillance at the human-animal interface. Integrated efforts are needed at the international and national levels, including guidance on how to restructure systems and plans to engender trust across countries, sectors, and public and private entities.

Post-Script: The Biden-Harris National Strategy

On March 11, 2021, President Biden signed a \$1.9 trillion dollar stimulus into law, the American Rescue Plan Act of 2021 (P.L.117-2). The sixth US relief package to be approved since the pandemic began, the bill includes funding for COVID-19 public health activities and infrastructure building, economic relief for families, businesses and state governments, tax credits and unemployment compensation. Funding for public health related activities totals approximately \$93 billion. Below we provide an overview of funding designated for COVID-19 related activities in the American Rescue Plan.^{452,453}

I. Testing, surveillance and Contact Tracing

\$47.8 billion for development of national testing, contact tracing and surveillance strategies to ensure all Americans have access to reliable and free testing and that states have adequate funding for contact tracing programs. \$1.5 billion is designated to support contact tracing and testing in the Indian Health Service and \$1.75 billion is for genomic sequencing and surveillance at the local and national levels.

II. Workforce capacity

\$7.66 billion for development of the public health workforce at the state and national levels. \$100 million for the medical reserve corps.

III. Supply chain

\$6.05 billion for supply chain and logistical support for research, development, manufacturing and purchasing of COVID-19 therapeutics, vaccines and other medical products. \$10 billion designated for procurement of medical supplies and equipment for COVID-19 under the Defense Production Act (for example, PPE, therapeutics).

IV. Vaccines

\$7.5 billion directed to Health and Human Services to support the Centers for Disease Control and Prevention and state, local, territorial and tribal public health departments to effectively deploy COVID-19 vaccines. This includes developing community vaccine centers and mobile vaccination units for rural areas and activating the Federal Emergency Management Agency and National Guard to help build vaccine clinics across the U.S. An additional \$1 billion is earmarked to support national vaccine health education campaigns. Another \$600 million will support vaccine distribution and administration through the Indian Health Service.

V. Research and development

\$500 million is for the FDA to support COVID-19 research and for ongoing evaluation of therapeutics, diagnostics and vaccines.

VI. Data

\$500 million for information system upgrades for public health.

VII: Local health system capacity

\$7.6 billion designated specifically for local community health centers to support COVID-19 related activities. This includes vaccine distribution and administration, workforce capacity building, community education efforts, contact tracing and testing.

The President's American Rescue Plan offers the United States a way forward. We hope these plans will be rapidly and effectively implemented.

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Appendix

COVID-19 Relief Funding for Domestic Public Health Efforts, Including for State, Local, Territorial and Tribal Jurisdictions, Kaiser Family Foundation⁴⁵⁴

The Coronavirus Preparedness and Response Supplemental Appropriations Act, 2020 (P.L. 116–123), enacted 3/6/20		
Agency/Program	Amount	Detailed Language
Centers for Disease Control and Prevention	\$1.6 billion <ul style="list-style-type: none"> of which not less than \$950 million is for State, local, Territorial, and Tribal Public Health Departments 	<p>“For an additional amount for “CDC-Wide Activities and Program Support”, \$2,200,000,000, to remain available until September 30, 2022, to prevent, prepare for, and respond to coronavirus, domestically or internationally:</p> <ul style="list-style-type: none"> Provided, That not less than \$950,000,000 of the amount provided shall be for grants to or cooperative agreements with States, localities, territories, tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes, to carry out surveillance, epidemiology, laboratory capacity, infection control, mitigation, communications, and other preparedness and response activities” and “not less than \$40,000,000 of such funds shall be allocated to tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes; Provided further that of the amount provided under this heading in this Act, not less than \$300,000,000 shall be for global disease detection and emergency response; Provided further, That of the amount provided under this heading in this Act, \$300,000,000 shall be transferred to and merged with amounts in the Infectious Diseases Rapid Response Reserve Fund.”
Coronavirus Aid, Relief, and Economic Security (CARES) Act (P.L. 116–136), enacted 3/27/20		
Agency/Program	Amount	Detailed Language
Centers for Disease Control and Prevention	\$3.5 billion <ul style="list-style-type: none"> of which not less than \$1.5 billion is for State, local, Territorial, and Tribal Public Health Departments 	<p>\$4,300,000,000 for CDC-Wide Activities and Program Support “to remain available until September 30, 2024, to prevent, prepare for, and respond to coronavirus, domestically or internationally:</p> <ul style="list-style-type: none"> “Provided, That not less than \$1,500,000,000 of the amount provided under this heading in this Act shall be for grants to or cooperative agreements with States, localities, territories, tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes, including to carry out surveillance, epidemiology, laboratory capacity, infection control, mitigation, communications, and other preparedness and response activities” and “not less than \$125,000,000 shall be allocated to tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes; Provided further, That of the amount provided under this heading in this Act, not less than \$500,000,000 shall be for global disease detection and emergency response; Provided further, That of the amount provided under this heading in this Act, not less than \$500,000,000 shall be for public health data surveillance and analytics infrastructure modernization; Provided further, That of the amount provided under this heading in this Act, \$300,000,000 shall be transferred to and merged with amounts in the Infectious Diseases Rapid Response Reserve Fund.”

Centers for Disease Control and Prevention	\$12.5 million	“For an additional amount for “Toxic Substances and Environmental Public Health”, \$12,500,000, to remain available until September 30, 2021, to prevent, prepare for, and respond to coronavirus, domestically or internationally: Provided, That \$7,500,000 of the funds provided under this heading in this Act shall be for necessary expenses of the Geospatial Research, Analysis and Services Program to support spatial analysis and Geographic Information System mapping of infectious disease hot spots, including cruise ships: Provided further, That \$5,000,000 of the funds provided under this heading in this Act shall be for necessary expenses for awards to Pediatric Environmental Health Specialty Units and state health departments to provide guidance and outreach on safe practices for disinfection for home, school, and daycare facilities.”
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The Paycheck Protection Program and Health Care Enhancement Act (P.L. 116–139), enacted 4/24/20

Agency/Program	Amount	Detailed Language
HHS Office of the Secretary, Public Health Social Services Emergency Fund (PHSSEF)	\$11 billion <ul style="list-style-type: none"> of which not less than \$10.25 billion is for State, local, and Territorial Health Departments of which not less than \$750 million is for the Indian Health Service 	“...Not less than \$11,000,000,000 shall be for States, localities, territories, tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes for necessary expenses to develop, purchase, administer, process, and analyze COVID-19 tests, including support for workforce, epidemiology, use by employers or in other settings, scale up of testing by public health, academic, commercial, and hospital laboratories, and community-based testing sites, health care facilities, and other entities engaged in COVID-19 testing, conduct surveillance, trace contacts, and other related activities related to COVID-19 testing; That of the amount identified in the preceding proviso...not less than \$750,000,000 shall be allocated in coordination with the Director of the Indian Health Service, to tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes.”
HHS Office of the Secretary, Public Health Social Services Emergency Fund (PHSSEF)	\$1 billion	“Not less than \$1,000,000,000 shall be transferred to the “CDC-Wide Activities and Program Support” for surveillance, epidemiology, laboratory capacity expansion, contact tracing, public health data surveillance and analytics infrastructure modernization, disseminating information about testing, and workforce support necessary to expand and improve COVID-19 testing.”

Coronavirus Response and Relief Supplemental Appropriations Act, 2021 (P.L. 116–260), enacted 12/27/20

Agency/Program	Amount	Detailed Language
Centers for Disease Control and Prevention	\$8.75 billion <ul style="list-style-type: none"> of which \$4.5 billion is for State, local, Territorial, and Tribal Public Health Departments 	“For an additional amount for “CDC-Wide Activities and Program Support”, \$8,750,000,000, to remain available until September 30, 2024, to prevent, prepare for, and respond to coronavirus, domestically or internationally: Provided, That amounts appropriated under this heading in this Act shall be for activities to plan, prepare for, promote, distribute, administer, monitor, and track coronavirus vaccines to ensure broad-based distribution, access, and vaccine coverage: <ul style="list-style-type: none"> Provided further, That of the amount appropriated under this heading in this Act, not less than \$4,500,000,000 shall be for States, localities, territories, tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes: Provided further, That of the amount in the preceding provision, \$210,000,000, shall be transferred to the “Department of Health and Human Services—Indian Health Service—Indian Health Services.”

<p>HHS Office of the Secretary, Public Health Social Services Emergency Fund (PHSSEF)</p>	<p>\$22.4 billion</p> <ul style="list-style-type: none"> • of which \$19.11 billion is for State, local and Territorial Health Departments • of which \$790 million is for the Indian Health Service • of which \$2.5 billion is for high-risk and underserved populations, including racial and ethnic minority populations 	<p>“For an additional amount for “Public Health and Social Services Emergency Fund”, \$22,400,000,000, to remain available until September 30, 2022, to prevent, prepare for, and respond to coronavirus, domestically or internationally, which shall be for necessary expenses for testing, contact tracing, surveillance, containment, and mitigation to monitor and suppress COVID-19, including tests for both active infection and prior exposure, including molecular, antigen, and serological tests, the manufacturing, procurement and distribution of tests, testing equipment and testing supplies, including personal protective equipment needed for administering tests, the development and validation of rapid, molecular point of-care tests, and other tests, support for workforce, epidemiology, to scale up academic, commercial, public health, and hospital laboratories, to conduct surveillance and contact tracing, support development of COVID-19 testing plans, and other related activities related to COVID-19 testing and mitigation:</p> <ul style="list-style-type: none"> • Provided, That amounts appropriated under this paragraph in this Act shall be for States, localities, territories, tribes, tribal organizations, urban Indian health organizations, or health service providers to tribes for necessary expenses for testing, contact tracing, surveillance, containment, and mitigation, including support for workforce, epidemiology, use by employers, elementary and secondary schools, child care facilities, institutions of higher education, long-term care facilities, or in other settings, scale up of testing by public health, academic, commercial, and hospital laboratories, and community-based testing sites, mobile testing units, health care facilities, and other entities engaged in COVID-19 testing, and other related activities related to COVID-19 testing, contact tracing, surveillance, containment, and mitigation which may include interstate compacts or other mutual aid agreements for such purposes; • Provided further, That of the amount appropriated under this paragraph in this Act, \$790,000,000, shall be transferred to the ‘Department of Health and Human Services—Indian Health Service—Indian Health Services; • Provided further, That of the amount appropriated under this paragraph in this Act...not less than \$2,500,000,000, shall be for strategies for improving testing capabilities and other purposes described in this paragraph in high-risk and underserved populations, including racial and ethnic minority populations and rural communities, as well as developing or identifying best practices for States and public health officials to use for contact tracing in high-risk and underserved populations, including racial and ethnic minority populations and rural communities and shall not be allocated pursuant to the formula in the preceding provision.”
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Note: The CARES Act also provided \$150 billion for the Coronavirus Relief Fund, for making payments to states, territories and tribes. Funds are available for amounts spent in response to COVID-19 crisis between March 1, 2020 and Dec. 31, 2020 that were not already budgeted in a state/territory’s most recent budget approved as of date of enactment. Jurisdictions apply for funds and certify expenditures on application. Because these funds are not specified for public health, they are not included here, but it is important to note that public health activities are an eligible expense. See Treasury Department.⁴⁵⁵

Source: Kaiser Family Foundation, personal communication with Jennifer Kates

Acknowledgements

We would like to extend our gratitude to the external experts who contributed to the case study through key informant interviews and reviews. We greatly appreciate their insights and perspectives.

The views expressed in this report are those of the authors, and do not reflect the opinions of the reviewers, interviewees, or their employers.

Drew Altman

Howard Bauchner

Stefano Bertozzi

Michael Bird

Tom Bollyky

Shruti Dhapodkar

Victor Dzau

Harvey Fineberg

Tom Frieden

Julio Frenk

Francis Fukuyama

Peter Hotez

Eduardo González-Pier

Peggy Hamburg

Jennifer Kates

Jeff Koplan

Darryl Lampkin

Nancy Lapolla

Larry Levitt

Mia Lozada

Nicole Lurie

Sylvia Mathews

Robert Rodriguez

George Rutherford

Mariano Sánchez-Talanquer

Robert Wachter

Jennie Wei

Leanna Wen

Mary Wilson

Special thanks to Katie Geissler, Arista Jhanjee and Lissette Irizarry for their administrative support, to Kerstin Svendsen for designing the document, and to Sir Richard Feachem for his advice and support.



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