



SYNOPSIS

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

Chair

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Introduction

Despite the United States' enormous wealth and unparalleled medical and scientific capacity, the country's epidemic dwarfs that of any other country. The U.S. reports more than 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, more than 400,000 American lives could have been saved.

The pandemic has also laid bare existing socio-economic, 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 fell by more than two years, with Latinx Americans suffering a drop of more than three years. While suffering lower mortality from the virus itself, women – notably women of color – experienced particularly severe economic consequences, with record numbers of women leaving the labor force. An additional eight million Americans may have slipped into poverty in 2020.

This case study, invited by the Independent Panel for Pandemic Preparedness and Response (IPPR), assesses the first year of U.S. experience in 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. While this report assesses the U.S. response to the virus, the story of COVID-19 is fundamentally about individuals, families and communities. The human impact of the pandemic – individual stories of lives taken, businesses shuttered, jobs lost, and dreams fractured – must anchor the sea of staggering statistics.

Epidemiologic analyses show that the U.S. performed poorly in comparison to the European Union and disastrously compared to East Asia. By the end of January 2021 – roughly one-year after its first case was detected – the U.S. had reported over 20 million cases, 79% more than the EU when adjusted for population. Cumulative U.S. cases per million people were almost 27 times those in the Asian Regional Comprehensive Economic Partnership minus China (RCEP14). It is likely that actual cases in the U.S. are 10 or more times higher than those reported. Testing did not begin in earnest in the U.S. until mid-March, almost two months after the virus arrived in the country, and U.S. testing policy continues to prioritize symptomatic patients over community testing.

The higher U.S. case rate led to substantially higher mortality than in the EU and the RCEP. The U.S. (1354 deaths/million) had a cumulative mortality rate 28% higher than the EU (1058 deaths/million), and 22-fold that of the RCEP14 (60 deaths/million). If the U.S. had the same cumulative deaths/million as the RCEP14 over the first year, a staggering 428,000 American lives would have been saved.

The U.S. epidemic is a composite of hundreds of different epidemics in communities across a large and politically divided country. Some regions have performed notably better than others, suggesting that poor national performance was not inevitable. Decisions on when and how to enact public health interventions were left to county public health departments, resulting in haphazard implementation even within the same state. If all states and counties had been as effective at containing the pandemic as Washington state (563 deaths/million), the U.S. would have had substantially lower mortality than the EU average.

Conclusions

- #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.
- #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 under-investment in public health, were key contributors to the staggering number of cases and deaths.
- #3 Immigrant, Black, Latinx, American Indian/Alaska Native populations, and those living in poverty, have suffered disproportionately from the COVID-19 pandemic.
- #4 The structure of the U.S. health system is fundamentally ill-suited to mounting an effective, coordinated response to a pandemic.

Recommendations

- Legislation granting emergency powers and funding for a rapid, coordinated, federally-led response during public health emergencies.
- An apolitical architecture for key public health institutions such as the CDC and FDA. Consider Federal Reserve model.
- Public Health Infrastructure Fund to modernize information technology infrastructure.
- Investments in public health capacity to develop and deploy basic public health measures at scale.
- Public messaging campaign to prepare for the next pandemic. Public education on need for emergency powers, potential loss of freedoms, and importance of compliance during public health emergencies.
- Significant investments to decrease racial and ethnic disparities in health. This includes better access to testing facilities, healthcare coverage and access, worker protections, sick leave benefits, and an expanded social safety net.
- 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.

Conclusions

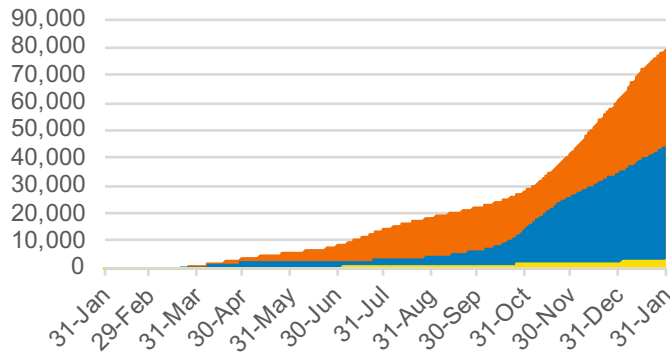
- #5 Hospitals in the U.S. were unprepared to cope with the high influx of COVID-19 patients.
- #6 U.S. commitment to vaccine development has been a defining success. Slow initial rollout and the absence of a coordinated national vaccination strategy has threatened to overshadow this singular achievement.
- #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.
- #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. The world needs a strengthened global architecture for pandemic preparedness and response.

Recommendations

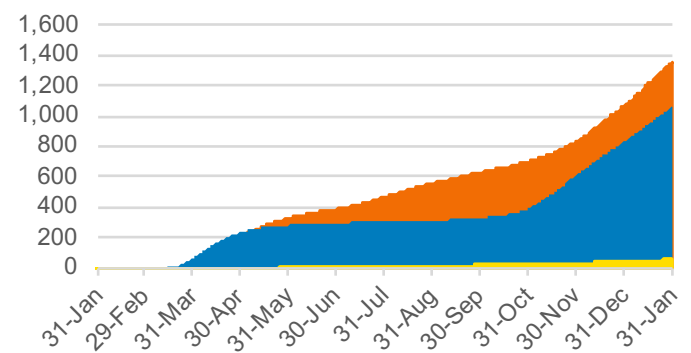
- Well stocked and expanded Strategic National Stockpile to cope with outbreaks of novel pathogens.
- Investments in strengthened domestic supply chains and early use of Defense Production Act.
- Disaster contingency planning for worst-case novel pathogens required for accreditation of hospitals.
- Federal 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.

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

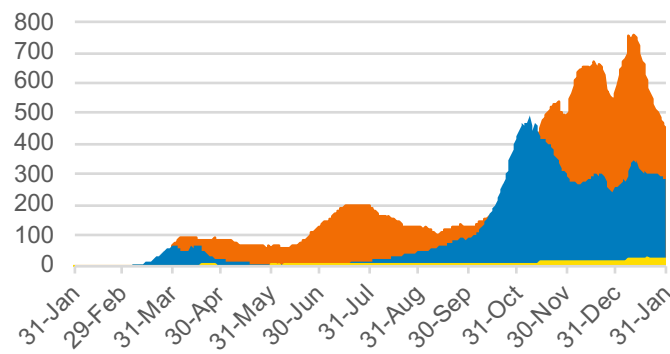
A: Cumulative COVID-19 cases per million



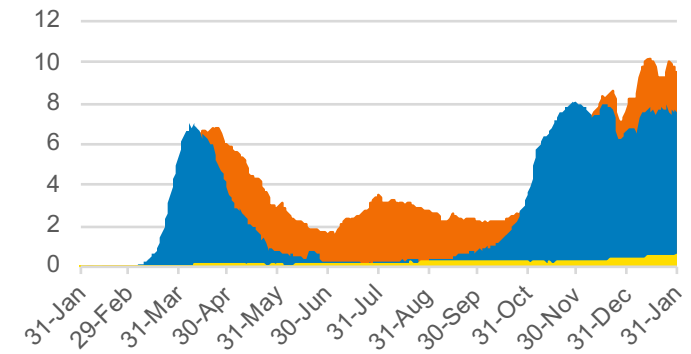
B: Cumulative COVID-19 deaths per million



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



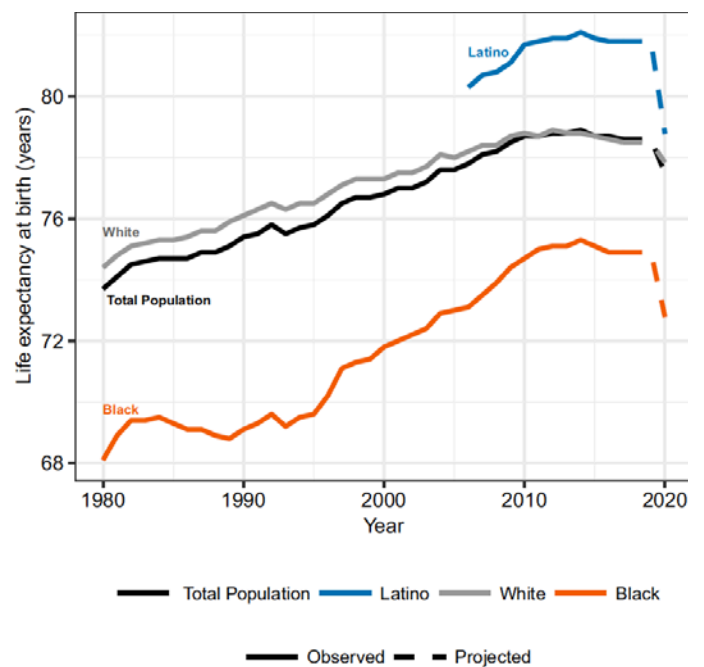
D: Daily new COVID-19 deaths per million, rolling 7-day average



■ United States
 ■ European Union
 ■ RCEP 14

The national response has categorically failed vulnerable populations. Without exception, communities of color and historically disadvantaged people suffered a far greater burden of sickness, death, and economic hardship. When adjusted for age, differences in outcomes for Black, Latinx, American Indian and Alaska Native communities are pronounced. Members of these communities were 3.7 to 4.1 times more likely than White Americans to be hospitalized, and between 2.6 to 2.8 times more likely to die from COVID-19. Modeling suggests the long-term consequences of this epidemic will be devastating for disadvantaged communities, widening gaps in life expectancy.

Figure 2. Projected trends in life expectancy by population



Leadership, Communication and Trust

The U.S. was well-positioned to mount an effective response to COVID-19. It ranked first for pandemic preparedness in the 2019 Global Health Security Index. Prior administrations had established a playbook for national health emergencies, and in mid-2019, the U.S. Department of Health and Human Services (DHHS) had led federal and state agencies in a simulation exercise based on a novel respiratory pathogen originating in China. But this playbook was not utilized. Many lessons learned in the simulation exercise – including the need for coordination across public agencies and investments in domestic capacity to manufacture vaccines, therapeutics, and personal protective equipment (PPE) – went unheeded.

National emergencies require leaders to communicate clearly, consistently and correctly. Conflicting messages from national leaders, state governors and public health experts sowed confusion in the minds of the American people. On January 29, 2020, a White House Coronavirus Task Force was created first with the DHHS Secretary and, shortly thereafter, the Vice President at its helm. Public health experts at the CDC were sidelined.

Pandemic response requires immediate action. The Task Force did not produce a national plan until March 11, by which time New York was in the midst of a deadly outbreak. That plan still failed to recognize that the U.S. was well past a viable containment phase and needed instead to pursue mitigation strategies. The delay was compounded by serious CDC missteps in rolling out testing, which allowed the virus to spread, largely undetected, across the U.S. for more than a month.

Progress was also hindered by erratic messaging from the White House. During March and April, the President led daily 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. This triumphal tone continued throughout 2020, even as U.S. case and death rates became among the highest in the world.

The U.S. response was complicated by its federal structure, in which responsibility for public health is devolved primarily to the states. The declaration of a public health emergency by the DHHS Secretary on January 31, 2020, provided federal authority and funding to support local public health agencies in response to the virus. However, the national government largely abdicated this role, declining to invoke the Defense Production Act early in the pandemic until the end of March. The Act would have compelled private companies to scale up production of medical supplies and equipment.

Without clear federal guidance, state strategies coalesced along partisan lines. Some states implemented shelter-in-place orders, closing schools and non-essential businesses. Others adopted a more laissez-faire approach, echoing former President Trump's many assurances that the threat from the virus was limited. This led to a haphazard array of subnational policies and fostered doubts about the reality of the threat. The Trump administration's recurrent attempts to undermine state orders also sowed public distrust and damaged the U.S. response.

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. For example, when President Trump announced federal recommendations for U.S. citizens to wear masks in early April, he immediately undermined the advice by adding, "I am choosing not to do it." In press briefings, he also seemed to offer potentially dangerous advice, such as repeatedly endorsing

hydroxychloroquine and raising the possibility of inhaling or ingesting bleach to treat COVID-19.

Scientific leaders contributed to the confusion, making a series of declarations that were later reversed, undermining public trust in the experts. CDC Director Robert Redfield went on national television numerous times, describing COVID-19 as a low threat to Americans. This was later justified as an attempt to reassure the public, but

instead conveyed a lack of urgency towards the evolving epidemic. Officials also initially downplayed the value of masks as a tool for personal protection, in part out of concerns that hoarding might deplete supply for healthcare workers. When the CDC finally reversed its guidance on masks on April 3, the use of masks had already become a partisan issue.

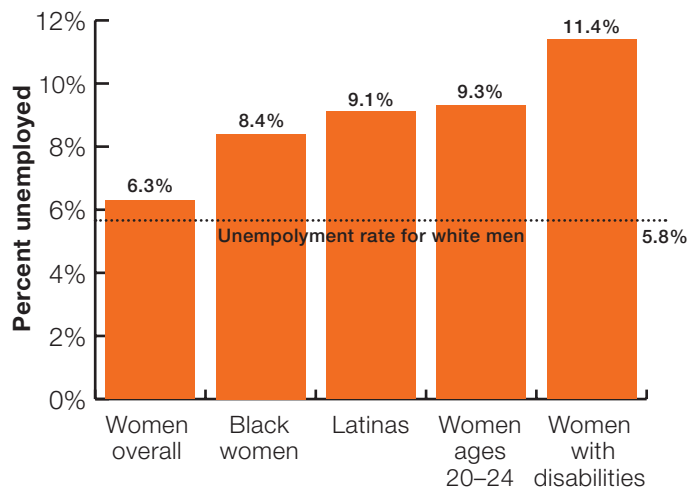
Economic Impact

Politicians 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 adequately.

The economic impact of the pandemic in the U.S. has been severe. Harvard economists David Cutler and Lawrence Summers have estimated direct GDP losses of \$11.4 trillion over the next decade due to COVID-19. Additional losses due to premature death, and long-term physical and mental health impairment raise the total economic cost to \$25–30 trillion, or 135% of annual GDP. Sectors that employ a large share of low-wage workers, such as accommodations, food services, education, and recreation, were especially hard hit. As 2020 ended, the American Policy Institute reported that almost 27 million Americans were unemployed, under-employed or had dropped out of the workforce. Food insecurity doubled overall and nearly tripled for families with children.

Lower-income and minority Americans disproportionately bore the pandemic's economic pain. 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 Black adults said they had to rely on a food bank to feed their families, versus 11% of White adults. Women of color and mothers of young children faced an excessive economic burden: 2.1 million fewer women were in the labor force in December 2020 than in February 2020. Unemployment rates for Black women and Latinas was 8.4% and 9.1% respectively vs. 5.8% for White men.

Figure 3. Women's unemployment rates, December 2020



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.

Because the U.S. healthcare system relies heavily on a fragmented employment-based private health insurance model, massive job losses meant that 2–3 million Americans may have lost their health coverage during the pandemic. The federal government increased Medicaid payments to states to offset costs associated with COVID-19 care, but there were no enhanced incentives to expand eligibility in the 12 states that had not expanded Medicaid eligibility under the Affordable Care Act (ACA), nor were there increases to the tax credit to support the individuals seeking non-employment-based coverage options under the ACA.

Many Americans were left to face high out-of-pocket costs for testing and treatment for COVID-19. The Families First Coronavirus Response Act provided \$1 billion to reimburse facilities for testing uninsured populations, but the DHHS deemed that only testing for “diagnostic purposes” and “when medically appropriate for the individual” would be reimbursed. As a result, wide-spread community testing, an invaluable tool for determining community spread of the virus, never materialized.

The pandemic’s direct economic costs were partially ameliorated by massive federal stimulus packages. At a cost of \$3.7 trillion, the federal government provided forgivable loans for businesses to prevent layoffs, direct stimulus checks to individuals, and enhanced and expanded unemployment benefits. The Federal Reserve also supported the economy through active monetary policy. This intervention boosted U.S. consumption by an estimated 6 percentage points during the first eight months of 2020 and prevented many business failures. When some support measures ended in August, an estimated additional 8 million people were plunged into poverty.

The amount of funding allocated to controlling the virus itself was inadequate. The Kaiser Family Foundation estimates that only about \$61 billion of the \$3.7 trillion in the stimulus packages went to public health activities, including surveillance, testing, contact tracing, and other mitigation strategies. This spending did not compensate for chronic underfunding of public health in the U.S., which invests only 2.5–3% of its total health sector budget on public health, across almost 3000 state, local, territorial and tribal agencies. Funding for the Centers for Disease Control and Prevention (CDC) had fallen by almost 30% between 2010 and 2019.

An emerging consensus suggests that value-for-money would have improved if a larger share of federal and state appropriations were targeted to virus control. The economic return for test and trace strategies would be 30 times the cost of these basic public health interventions, according to Cutler and Summers. A program that pursued isolation policies for those exposed, as used in East Asia, could also avert several million new cases per month.

Public Health Interventions

An emerging The U.S. had advance warning of the virus, which should have allowed the country to craft effective public health countermeasures. On January 3, 2020, the director of China CDC called his counterpart in the U.S., to warn him of a rapidly spreading pathogen. The SARS-CoV-2 genome was published on January 11, more than a week before the first case was identified in Seattle. Despite this early warning, the U.S. public-health response to COVID-19 was hindered by critical missteps.

Testing Problems

At the start of an epidemic, it is vital to rapidly deploy diagnostic tests and implement surveillance to track the spread of cases. Despite early warnings, more than a month passed before the CDC was able to widely distribute a functional test. The CDC first chose to reject existing tests and create its own kits; these were later found to be contaminated. The agency also initially required that all samples be sent to its Atlanta headquarters, creating bottlenecks in testing and reporting. Early guidelines restricted testing to those with symptoms who had traveled from China. By March 11, the U.S. had tested only 23 people per million while South Korea had tested over 3600 per million. While test results in South Korea were available within 24 hours, test results in the U.S. often took more than 7 days, limiting their usefulness. The failure in testing likely contributed to the severity of the first major outbreak in New York, during which nearly 17,000 people died in six weeks.

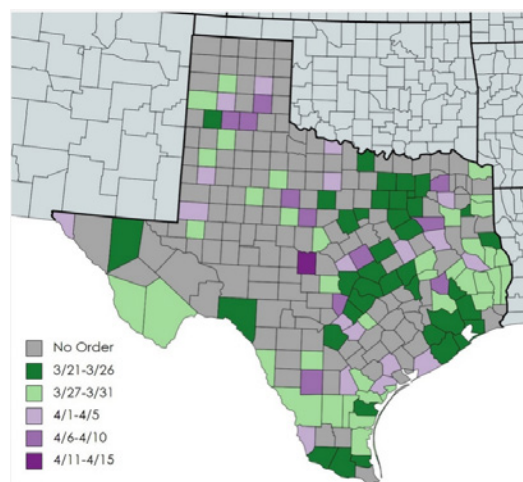
Lockdowns: The Blunt Instrument

As COVID-19 spread, shelter-in-place orders (“lockdowns”), were implemented across the U.S. These initial orders lasted up to nine weeks in some areas, while other areas never implemented

them. Even within states there was considerable county-level variation in policy implementation.

In theory, temporary initial lockdowns serve to buy time for public health agencies to design a new set of interventions, which reduce the need for future lockdowns. Based on the experiences of other countries, a lockdown replacement package in the U.S. could have included widespread community testing and contact tracing, strong isolation and quarantine policies with financial and social support, mandatory mask wearing, social distancing, bans on certain events and border controls. However, consistent national guidelines for lockdown replacement packages never materialized. This left states and local agencies to design their own policies amidst recurrent lockdowns, exhausting the cooperation of the public.

Figure 4. Lockdown orders by date enacted in Texas counties, March to April 2020



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

Isolation and Quarantine Policies

Current policy in the U.S. requires COVID-positive individuals to isolate at home and recommends that those who have been in contact with positive patients quarantine similarly. These policies fundamentally neglect the reality of many disadvantaged low-income Americans who live in multi-generational households and/or cannot afford to take unpaid time off of work. Several cities provided support for isolation of the homeless and very low-income populations, but the federal government never adopted such policies.

Mask Mandates

Face coverings have been recommended to prevent transmission of respiratory diseases since the 14th century. Some models suggested that if 80–90% of the population used masks consistently the disease could be eliminated. Goldman Sachs proposed that reasonable compliance with a national mask mandate could substitute for renewed lockdowns, which would otherwise reduce U.S. GDP by 5%.

The U.S.' muddled approach allowed politicization of the masking message. Early on, many public health experts took a position against community use of masks. In Congressional testimony on February 27, the CDC director rejected the use of face masks as a way to reduce spread of the disease. The initial unequivocal rejection of mask usage caused public confusion and allowed for the subsequent partisan divide on the issue. Political divisions were mirrored in outbreak epidemiology.

Bans on Events

Restrictions on large gatherings such as sporting events, church services, concerts and political rallies, play an important role in COVID-19 control because crowding indoors in poorly ventilated spaces creates the ideal scenario for transmission. In March 2020, the CDC recommended rescheduling large gatherings during the initial national lockdown. But it has since published guidance

that stops short of recommending bans on events. Some states continued to allow large public gatherings, leading to a number of super-spreader events such as the Sturgis Motorcycle Rally in South Dakota.

Travel Policies

Early and rigorous travel bans, combined with incoming traveler quarantines and measures to track positive cases, contributed to successful COVID-19 control in several countries. In the U.S., incomplete implementation of border control policies stymied their effect. The U.S. imposed travel restrictions on people traveling from China on January 31, 2020 – yet nearly 40,000 passengers from China entered the U.S. between February 2 and April 4. In March, the U.S. also restricted travel from Iran, parts of Europe and Brazil. But the country never consistently implemented early screening at airports. On January 12, 2021, the CDC finally 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.

Genomic Surveillance

Regular genomic sequencing for surveillance of SARS-CoV-2 mutations is an important public health tool. Robust genomic sequencing and epidemiology can ensure that deadlier, more contagious and/or vaccine-resistant variants do not spread undetected. The U.S. initially did not invest in a strong SARS-CoV-2 genomic surveillance program, despite having the largest COVID-19 outbreak in the world. In May, the CDC created the National Open Genomics Consortium, SPHERES, did not build an infrastructure for large-scale sequencing. As of January 15, 2021, the U.S. had sequenced as few as 0.3% of COVID-19 infections compared to nearly 5% in the U.K., 12% in Denmark, and 60% in Australia. Since then, however, the CDC has significantly increased genomic surveillance to track evolution of variants.

Health System Resilience

Although U.S. hospitals have significant technological and intellectual medical capacity, COVID-19 surges repeatedly stressed local hospitals and clinics. Pressure points included low bed capacity, a strained workforce, and limited availability of medications, oxygen and personal protective equipment.

Healthcare System Capacity

Despite having the highest health spending per capita in the world, the U.S. entered the pandemic with fewer hospital beds per thousand (2.9) than most countries in the Organization for Economic Co-operation and Development (OECD). As the pandemic surged, U.S. hospitals faced critical shortages in intensive care unit (ICU) and acute care bed capacity and in the supplies needed to care for patients. Most cancelled elective procedures in an attempt to reserve capacity for COVID-19 hospitalizations, and some converted endoscopy suites, operating rooms, maternity and neonatal wards into acute care beds. Strains in ICU capacity specifically led to poor patient outcomes, doubling the risk of mortality according to one cohort study. Care delays for patients with non-COVID-19 illnesses also led to negative outcomes. According to a recent study, 40% of U.S. adults delayed or avoided medical care due to COVID-19, including 12% who required urgent care.

COVID-19 also presented challenges for U.S. primary care. With new operational requirements to minimize infection risk, medical offices were forced to decrease in-person visits, change patient flow, and ramp up phone and video consultations. Expansion of telehealth services and reimbursement rules have mitigated some of barriers to access. Despite this, primary care visits were down 20% in the second quarter of 2020 compared to 2019. The long-term effects of

these decreases are unclear, but delays in seeking preventive services may lead to future increases in cancers and other detectable/preventable diseases. Additionally, chronic post-COVID-19 symptoms among the 30 million patients who have recovered from the disease will continue to burden the primary care system.

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

The U.S. has one of the lowest doctor-to-person ratios in the OECD at 2.6/1000, contributing to doctor shortages during outbreaks. There were also serious shortages of nurses and respiratory therapists. As surges across the U.S. drew clinical provider capacity even tighter, bidding wars led to a redistribution of clinical labor toward wealthier institutions and exacerbated many social inequities even further. Significant levels of illness, burnout, and mental health issues among frontline workers have led to high healthcare worker attrition rates.

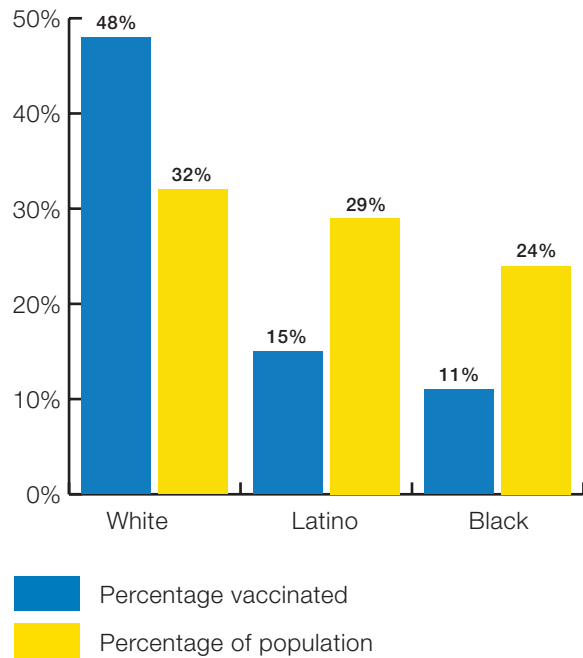
Essential Supplies for the Healthcare System

Early in the pandemic, the U.S. struggled to ensure adequate medical supplies and PPE. The Strategic National Stockpile, which contains emergency supplies for epidemics, had not been replenished after the 2009 H1N1 influenza pandemic. The President did not invoke the Defense Production Act to compel industry to scale-up production of supplies until mid-March. Responsibility for procurement of PPE was left to the states, without federal guidance or coordination. In the meantime, poor coordination allowed U.S. producers to continue to export PPE, exacerbating domestic shortages that continued into the fall.

Vaccine Deployment: Operational Challenges

Despite the remarkable success in developing new vaccines for COVID-19, inadequate planning made initial roll-out sluggish and marred by inequitable distribution. In September 2020, the Trump administration promised to have 100 million vaccination doses distributed by the end of 2020 with at least 20 million people vaccinated; by December 31, only 14 million doses were distributed and 2.8 million people vaccinated. The federal government left overtaxed state public health agencies to develop delivery strategies, and initial guidance from the CDC on how to allocate the vaccine was overly complicated. Some states responded by defining their own priority groupings, causing public confusion. Hundreds of public and private organizations who distributed vaccines also developed widely discordant and often inequitable distribution plans, leading to large inequities by race and ethnic group: racial groups at highest risk for COVID-19 infection have some of the lowest vaccination rates.

Figure 5. Disparities in vaccine administration in New York City, January 2021



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>.

The U.S. quickly activated its biomedical innovation ecosystem to develop novel diagnostics, therapeutics and vaccines. Collaborative efforts of industry, academic, and government scientists rapidly advanced research on SARS-CoV-2. Health workers mobilized to create information-sharing networks that improved patient care. Many positive lessons can be drawn from the U.S. experience supporting the generation of knowledge and tools for COVID-19.

The Vaccine Success

The development of messenger ribonucleic acid (mRNA) vaccines by Moderna and Pfizer-BioNTech in less than a year from the initial characterization of SARS-CoV-2 is a remarkable scientific achievement. The development and approval of COVID-19 vaccines under Operation Warp Speed (OWS), a public-private partnership led by DHHS, was the most notable success in the U.S. response. Through OWS, the U.S. funded advance-purchase agreements with six vaccine companies, buffering risk for private industry. COVID-19 mRNA vaccines significantly outpaced development expectations. Other vaccine technologies have also been accelerated, creating a set of tools that may eventually bring the pandemic to an end.

The FDA, the federal agency responsible for approval of vaccine and drug candidates in the U.S., played a pivotal role in accelerating COVID-19 vaccine authorization. The FDA withstood political interference to maintain stringent requirements around the safety and efficacy of the candidates. The agency dramatically expedited new product reviews which can otherwise take years.

Therapeutics

As of October 31, OWS had committed only \$2.8 billion to therapeutics, compared to \$13.3 billion for vaccines, largely in support of private sector research. Private companies, rather than government labs, funded many of the advanced novel drugs currently in the R&D pipeline. The absence of a large coordinated national clinical trial infrastructure for COVID-19 in the U.S. has posed challenges to search for treatments. Many of the hundreds of clinical trials around the country were not adequately designed or enrolled, and therefore failed to produce actionable results.

Diagnostic Technology

Following the early CDC diagnostic testing failure, private labs and academic researchers led extensive efforts to develop new assays and platforms. These groups have developed testing technologies, including rapid diagnostic tests and at-home antigen tests. But the FDA did not permit academic and private labs to produce COVID-19 test kits until February 28, when it was impossible to ignore national shortages and data backlogs.

In March 2020, the FDA overcorrected its previously strict rules and allowed test developers to market and sell validated serological kits, requiring only that developers submitted test details to the FDA and alerted patients that the tests had not been formally approved. Poorly developed tests flooded the market and many companies failed properly to indicate test limitations to patients. The FDA has received notice of numerous violations of its policy.

Basic Science & Clinical Innovation

U.S. scientific and medical communities tapped pre-existing collaborations to share information and accelerate COVID-19 basic science and clinical research internationally and domestically.

Medical associations and universities launched real-time learning networks for clinical providers, scientists, and public health officials. Access to open-source documents and pre-publication research papers gave health care workers and epidemiologists unprecedentedly rapid access to insights into prevention and control and therapies. Many academic centers have also committed to sharing their expertise through virtual conferences and have developed free COVID-19 training programs to support clinician education.

Global Health Security Research

Government and academic scientists have been at the forefront of research on emerging pathogens with pandemic potential. Unfortunately,

cuts to global health and pandemic prevention research have been severe in recent years. The USAID Emerging Pandemic Threats program has funded research on emerging pathogens, in part through PREDICT, which detected, diagnosed, and responded to epidemic threats across a network of partners in 36 countries. PREDICT teams worldwide have supported COVID-19 response. A majority of novel diseases are zoonotic, suggesting that human encroachment on animal habitats could trigger new epidemics. As climate change accelerates, ongoing research is key to prevent future pandemics.

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:

I. Testing, surveillance and Contact Tracing

\$47.8 billion is reserved 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.

II. Workforce capacity

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

III. Supply chain

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

IV. Vaccines

\$7.5 billion will be directed to Health and Human Services to support the Centers for Disease Control and Prevention and 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 is for information system upgrades for public health.

VII: Local health system capacity

\$7.6 billion is 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.