Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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COVID-19 pandemic in the United States

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ABSTRACT

Objectives: The paper highlights US health policy and technology responses to the COVID-19 pandemic from January 1, 2020 – August 9, 2020.

Methods: A review of primary data sources in the US was conducted. The data were summarized to describe national and state-level trends in the spread of COVID-19 and in policy and technology solutions.

Results: COVID-19 cases and deaths initially peaked in late March and April, but after a brief reduction in June cases and deaths began rising again during July and continued to climb into early August. The US policy response is best characterized by its federalist, decentralized nature. The national government has led in terms of economic and fiscal response, increasing funding for scientific research into testing, treatment, and vaccines, and in creating more favorable regulations for the use of telemedicine. State governments have been responsible for many of the containment, testing, and treatment responses, often with little federal government support. Policies that favor economic re-opening are often followed by increases in state-level case numbers, which are then followed by stricter containment measures, such as mask wearing or pausing re-opening plans.

Conclusions: While all US states have begun to "re-open" economic activities, this trend appears to be largely driven by social tensions and economic motivations rather than an ability to effectively test and surveil populations.

Introduction

The United States (US) response to the COVID-19 pandemic has been defined by the division of power between the US state governments and the federal government. Much of the policy and technology reaction has been driven by individual state decisions, and even within states at the county level with little guidance from the national government. A primary issue in the US has been the poor coordination of testing efforts and inability to test at-scale to provide comprehensive national (or even state) surveillance. There has also been a strong tension between the desire to "re-open" the economy to mitigate financial hardship and efforts to contain the spread of the virus and reduce the health impacts.

This paper presents an overview of the COVID-19 pandemic in the US. We first provide context for the pandemic and response by discussing US population health and the health care system. We then describe the spread of the virus between January and August 2020. Details of the national and state-level health and economic policy and technology responses are then discussed and related to the epidemiological spread of COVID-19 in the US.

Population health and health care system context

Population health

Table 1 provides an overview of US population health, and Table 2 summarizes the ten leading causes of death as of 2017. Over two-thirds of adult Americans are obese or overweight, almost half of adults are hypertensive, and 13% have diabetes; all three of these diseases have emerged as common comorbidities of hospitalized COVID-19 patients [1,2]. As shown in Table 1, life expectancy and poverty vary substantially by race/ethnicity.

Life expectancy also diverges by income: the difference in life expectancy for women in the top 1% of households by income and the bottom 1% is 10 years; for men, this difference is almost 15 years [12]. The US is also home to approximately 44.7 million immigrants, with 11.3 million estimated to be undocumented (without legal status) [13]. About 2.3 million people in the US are

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Table 1
US population health summary.

Characteristic	Summary statistic
Total Population [3]	329 million
Population <14 years [3]	18.5%
Population >60 years [3]	22.4%
Median Age [3]	38.2 years
Average Life Expectancy, Total [3]	78.6 years
Men	76.1 years
Women	81.1 years
Average Life Expectancy of White Americans [4]	78.8 years
Average Life Expectancy of Black Americans [4]	75.3 years
Average Life Expectancy of Hispanic Americans [4]	81.8 years
Average Life Expectancy of Native Americans [5]	73.0 years
At Least 1 Chronic Disease [6]	60%
Diabetes [7]	13%
Hypertension [8]	45%
Obese or Overweight [9]	71%
Daily Smokers [10]	10%
Average Annual Alcohol Consumption per Capita (>14 Years Old) [10]	8.9L
Population Density [3]	36/km^2 (93/mi^2)
Urban-dwelling [3]	83%
Population Below Poverty Line [11]	11.8%
White	10.1%
Black	20.8%
Hispanic	17.6%

Table 2
Leading causes of death in the US, 2017.

Rank	Cause of Death
1	Heart disease
2	Cancer
3	Accidents/unintentional injuries
4	Chronic lower respiratory diseases
5	Stroke/cerebrovascular disease
6	Alzheimer's disease
7	Diabetes
8	Influenza and pneumonia
9	Kidney disease
10	Intentional self-harm/suicide

Source: Centers for Disease Control and Prevention [18].

incarcerated (the US incarceration rate is 698 per 100,000, the highest in the world), and approximately 1.3 million individuals live in nursing facilities [14,15].

Fig. 1 displays key state-level demographic and health statistics. Panel A shows how population density varies across the country, with southern and eastern states and California being the densest. Southern states also have the lowest life expectancy at birth (Panel B) and have higher levels of poverty (Panel C). The Midwest and New England are the least racially diverse regions (Panel D).

Prior to the emergence of COVID-19, one of the most significant challenges in US health care policy was the opioid epidemic. In 2017, the US Department of Health and Human Services (HHS) declared a public health emergency. Approximately 2 million people had an opioid use disorder and an estimated 130 people died every day from an opioid-related drug overdose in 2018 [16]. At both the federal and state levels, policies primarily focus on decreasing prescribing rates, harm reduction, and expanded treatment [17].

Health care system

Although the US spends more per capita on health care than any other nation, it has relatively poor health outcomes and health care coverage [19]. The US has a predominantly private employer-based and individual insurance system, where enrollment is voluntary. About half (49%) of individuals obtain their insurance coverage privately via their employer, 14% from Medicare (primarily age-based, public, federal program), 20% from Medicaid (low-income, public, state-based program), 6% from the private individual market, 1% from the military/Veterans Administration, and 9% uninsured [19]. Nearly all physicians (90%) accept some type of private insurance, most (85%) accept Medicare, but only about 70% accept new patients insured by Medicaid, and acceptance of insurance type varies widely by physician specialty [20]. In the US, patient out-of-pocket spending is approximately $1,125 per capita, or around 11% of total health expenditure [21].

On the provider and delivery system side, there are just over 6,000 hospitals in the US; the majority (approximately 80%) are privately owned, and of those, 70% are non-profits [22]. There are about 2,000 "safety net" hospitals in US, which are hospitals (publicly or privately owned) that provide care to a substantial share of vulnerable patients irrespective of their ability to pay [23]. In terms of physician practices, about 40% of US physicians report ownership status, while the majority (55%) are employees [24]. Physician compensation can be based on multiple factors, including salary (65% of physicians), personal productivity (55%), practice financial performance (30%), or bonuses (33%) [24]. Table 3 summarizes US health care workforce capacity and supply.

Telemedicine coverage

In 2019, telemedicine coverage and policies were determined largely on a state-by-state basis: 16 states had payment parity between telehealth services and in-person services for private coverage, and 28 had coverage parity policies for their state Medicaid programs. Most states did not have a restriction around provider types or patient setting as a condition for payment. While most states allowed for remote patient monitoring or "store and forward" (provider reviews previously recorded video/audio), 16 states limited telehealth services to synchronous technologies [28].

COVID-19 trends in the United States

Data availability

Data collection and reporting in the US is continually evolving. The Centers for Disease Control and Prevention (CDC) is the leading federal public health institute in the US and releases daily updates on the number of total COVID-19 cases, new cases, total deaths, new deaths, and testing (the CDC began reporting testing

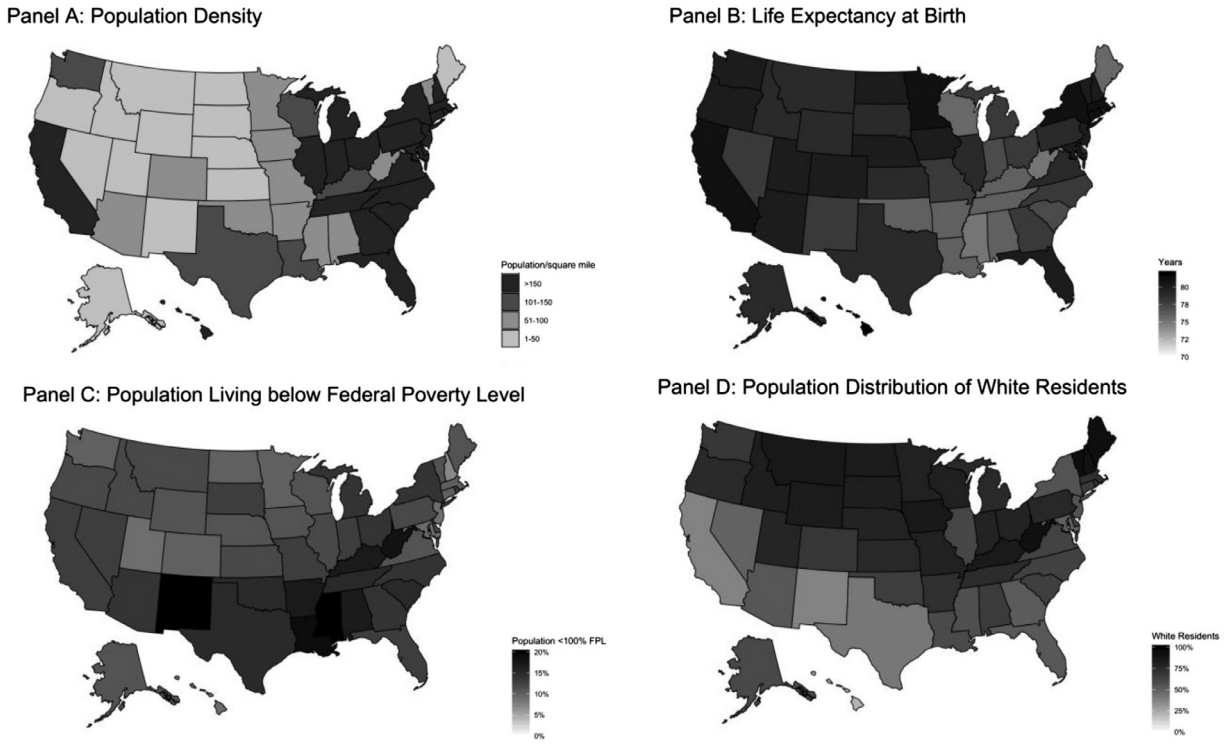

Fig. 1. State-level population demographics and health.

Table 3
Health care workforce, capacity, and supply.

Characteristic	Summary Statistic
Physicians [25]	2.6 / 1000 population
Nurses [25]	11.7 / 1000 population
Primary Care Practitioners [19]	43%
General Hospital Beds [26]	23.5 / 10,000 population
ICU Beds [26]	2.7 / 10,000 population
Community Health Centers (safety net outpatient care) [26]	1331
MRI Units [25]	18.5 / 1 million population
CT Units [25]	28.9 / 1 million population
Ventilator Units*	609 / 1 million population

* In a March 2020 bulletin, the Society for Critical Care Medicine estimated that US hospitals have approximately 62,000 full-featured mechanical ventilators; including older models, the emergency supply from the Strategic National Stockpile and anesthesia machines, there are an estimated 200,000 units nationally (approximately 609 units per 1 million individuals) [27].

data as of May 9, approximately 15 weeks after the first known US case; on May 25 it was reported that the CDC had been conflating the results of antibody and viral tests) [29]. The national totals are based on state health department reports, and case rates are based on these reports and the 2018 US Census Bureau American Community Survey [30]. The CDC provides a weekly report of provisional COVID-19 deaths by age and sex, and releases weekly updates of total provisional deaths by race/ethnicity [31]. In mid-July the Trump Administration required the CDC to stop reporting hospitalization and ICU data and mandated the Department of Health and Human Services (HHS) release these statistics via a new online platform, "HHS Protect" [32]. After a one-week hiatus, the data became available through HHS Protect, but as of August 9 continued to have issues with inconsistencies, delays, and missing data [33,34].

The Johns Hopkins University (JHU) Coronavirus Resource Center also tracks COVID-19 cases through a map-based dashboard and is updated multiple times per day. Unlike the CDC, the JHU dashboard has collected testing and hospitalization data from local and state health departments from the beginning of the outbreak, making it a preferable data source to federal government sources such as the CDC or HHS. Specifically, the JHU dashboard includes US state and county-level data on the data elements listed in Table 4. The JHU dashboard gathers data from the Center for Systems Science and Engineering at JHU, and multiple other sources, including US county and state health departments and data aggregating websites including the COVID Tracking Project [35]. The COVID Tracking Project obtains testing and hospitalization data from state public health authorities [36].[1]

Nursing facilities

Nursing facility data has also been subject to uneven and delayed reporting. Long-term care (LTC) and nursing facilities were only required to report COVID-19 cases among residents and staff

[1] After the CDC began releasing testing data, the COVID Tracking Project compared their data from state health departments to the CDC's and found substantial discrepancies in some cases (with the CDC often reporting higher rates of testing). The CDC has also not released historical testing data for the first 3 months of the outbreak. See COVID Tracking Project comparison paper for more details [139].

Table 4
US COVID-19 data from JHU coronavirus resource center.

Data Element	Definition
Confirmed Cases	All positive cases (including those pending confirmation by CDC)
Deaths	Confirmed and probable
Recovered Cases	Based on local media reports, state and local reporting
Active Cases	Total confirmed - total recovered – total deaths
Incidence Rate	Total number confirmed cases per 100,000 people
Case-Fatality Ratio	Number recorded deaths / number confirmed cases (%)
Testing Rate	Total test results per 100,000 people
Cumulative Hospitalization Rate	Total number hospitalized / number of confirmed cases (%)

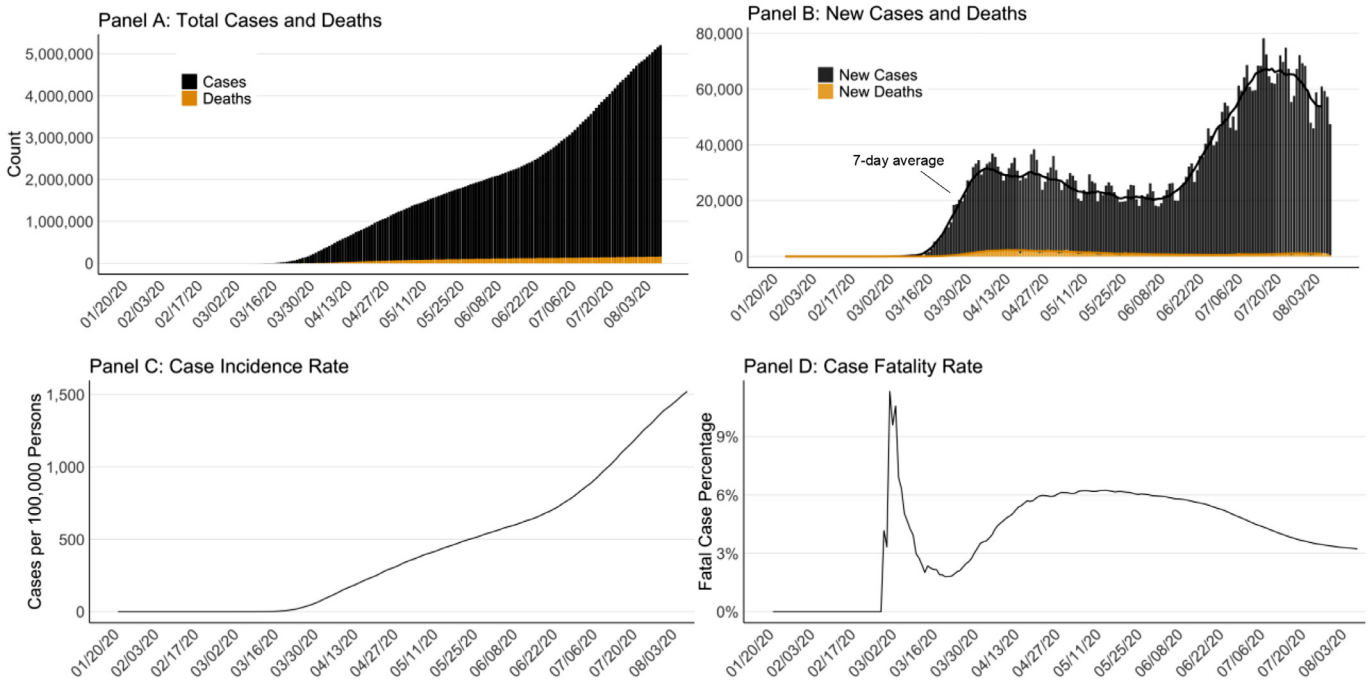

Fig. 2. US COVID-19 trends.

starting in late April [37]. In early May, new guidance was issued that required reports every seven days [38]. Although states are not required to publicly report these data, as of August 9, 47 states report at least some form of LTC and nursing facility data [26]. While early rounds of nursing home data were inconsistent and fluctuated as facilities adapted to the new reporting system, weekly reporting stabilized by early June [39].

COVID-19 spread

The first COVID-19 case (confirmed via serological test) in the US was reported in Washington state on January 20, the same day as the first reported case in South Korea [40,41]. Twelve weeks later, on April 11, the US surpassed Italy as the country with the most reported COVID-19 deaths (approximately 24,000, while South Korea had 10,450 deaths at that date). Below we describe national-level trends in greater detail, followed by state-level trends, which vary widely between and within states.

National trends

Fig. 2 displays cumulative cases and deaths per day (Panel A), new cases and new deaths (count and a 7-day moving average, Panel B), the case incidence rate (cases per 100,000 persons, Panel C), and the case-fatality rate (number of deaths per case (%), Panel D) over time. Cases and deaths are based on the JHU Coronavirus Resource Center definitions, which include both confirmed and probable cases where reported (Table 4). As of August 9, 2020, the cumulative total number of cases was 5.04 million and the total number of deaths was 162,919. New cases initially peaked around late March, followed by a subsequent lagged increase in new deaths in late April. After a drop in new cases during April and May, the summer months saw another increase in new cases, which began to decline in late July/early August. While the case incidence rate increased at a steeper rate in July as the number of new cases began increasing again, the case-fatality ratio had stabilized to about 5.8% in early June and then began decreasing in July.[2] Deaths have primarily been concentrated in older age groups (Fig. 3) and have disproportionately burdened Black Americans (Table 5). As of August 9, the most recent nursing home resident data reported were from July 26, with approximately 164,000 confirmed cases and 43,000 deaths [39].

Fig. 4 shows hospitalization rates over time (based on states reporting cumulative hospitalizations: cumulative hospitalizations/total confirmed cases). As of August 9, the average US hospitalization rate was at approximately 6%, down from a peak of about 14% in late March. However, these numbers should be interpreted with caution, due to the above-noted difficulties with hospitalization data reporting, and variation and lack of transparency around how states classify hospitalized COVID-19 cases [34].

[2] During early testing phases, the case fatality rate may be biased upward because testing is more likely to occur for more severe cases. Basu 2020 estimates the infection fatality rate to be between 0.6%-2.1% based on data through April 20, 2020 [140].

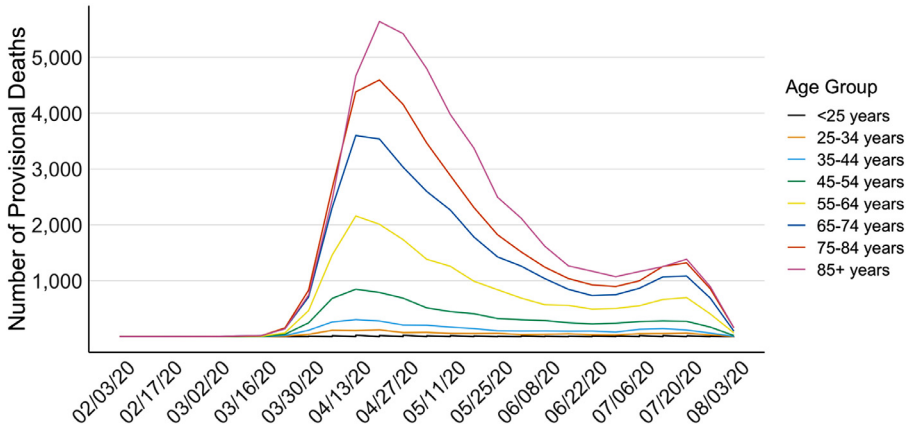

Fig. 3. Weekly provisional COVID-19 deaths by age group, January 27, 2020 – August 1, 2020.

Table 5
Total provisional COVID-19 deaths by race/ethnicity as of August 9, 2020.

Race/Ethnicity	COVID-19 Deaths (%)	Weighted Population Distribution (%)
Non-Hispanic White	51.8	41.3
Non-Hispanic Black	22.0	16.0
Non-Hispanic American Indian or Alaska Native	1.0	0.3
Non-Hispanic Asian	4.6	10.2
Hispanic	19.5	30.3
Other	1.2	1.9

Source: Centers for Disease Control and Prevention [31].

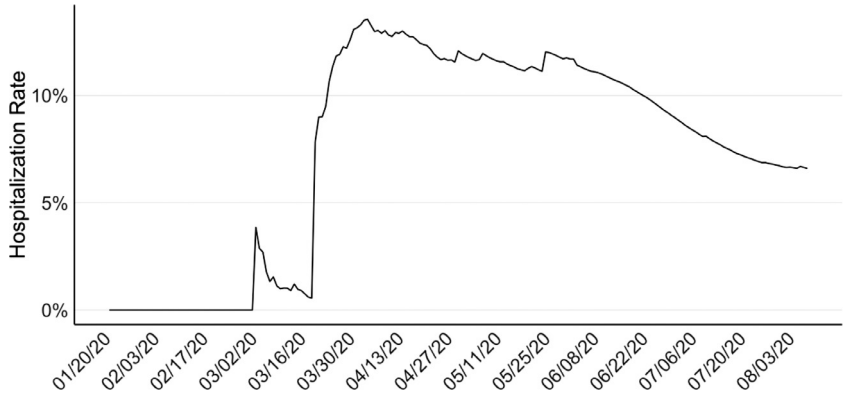

Fig. 4. Daily hospitalization rate.

Fig. 5 displays testing rates, defined as positive and negative results per 100,000 individuals.

The US has struggled to implement widespread testing due in large part to three main factors: i) early issues with verification of tests disseminated by the CDC [42,43], ii) regulatory delays with the Food & Drug Administration (FDA) to approve new tests before relaxing these rules in March to allow broader development and manufacture [44], and iii) false and conflicting statements issued by the Trump Administration [45]. As testing rates have increased, capacity constraints and wait times have become a challenge (see Section 4.4 for further discussion).

State trends

Data collection, reporting, and COVID-19 spread has varied widely by state. Fig. 6 shows the progress of state-level case incidence rates between April 1 and August 1, 2020. Although Washington state experienced the first COVID-19 case, the figure illustrates how New York state became the epicenter of the US outbreak during April and May, but that a number of other states saw sharp increases in their case rates during July, including Arizona, Louisiana, and Florida.

Fig. 7 demonstrates the slow rollout of testing between April 1 and August 1, 2020, as well as the variation in testing rates between states and the overall low rates of testing. By August 1, New York state had greatly increased their testing to 30% (up from around 10% on June 1), but the median testing rate across all states was 15%.

Policy and technology response

Overall, the policy and technology response in the US can be characterized by a strongly decentralized nature, with the federal government bearing responsibility for large economic stimulus packages and states taking the lead on many containment and health measures. Fig. 8 contains a timeline of major national-level policies and measures taken in response to COVID-19, including some measures counter to a global health response.

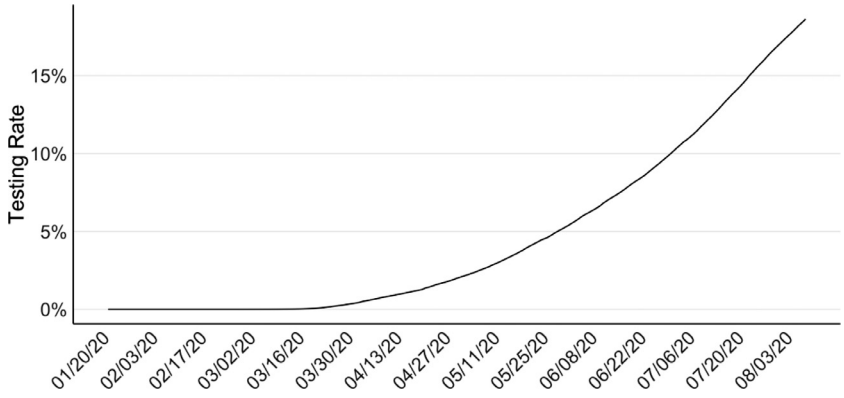

Fig. 5. Daily testing rate.

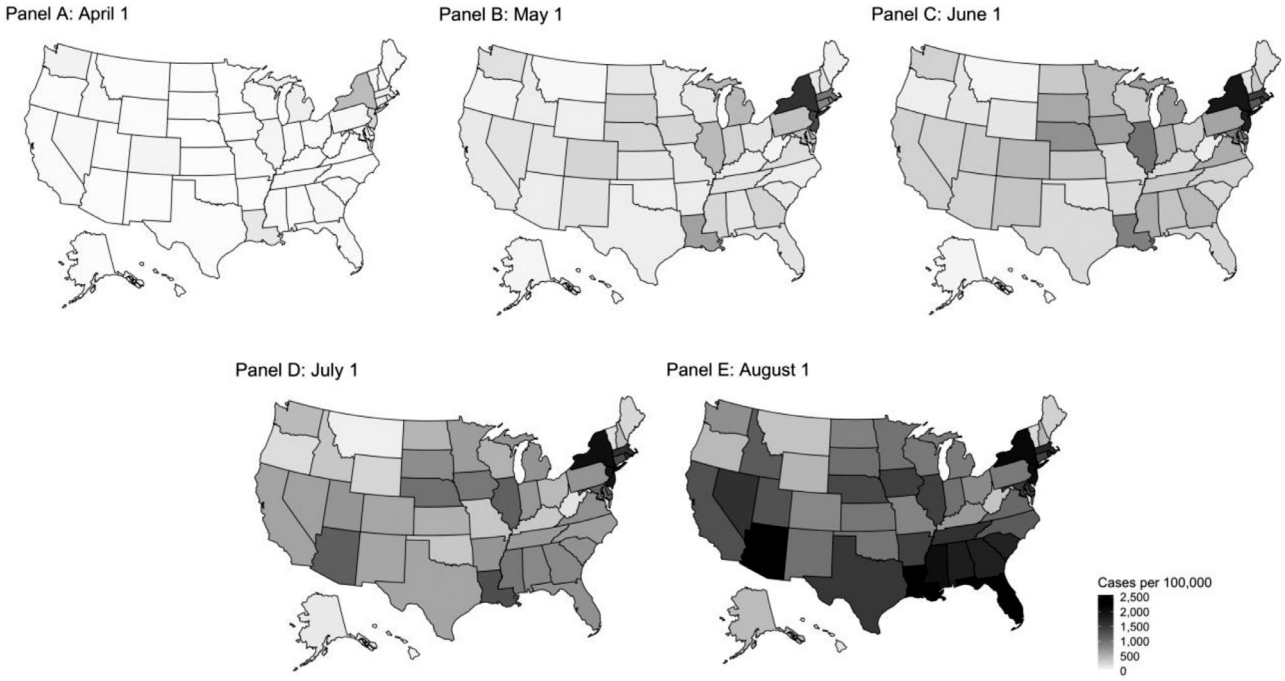

Fig. 6. Case incidence rates April 1, 2010 – August 1, 2020.

Mitigation policy

Early mitigation efforts took the form of travel restrictions and warnings, but by March 13 the federal government escalated from a public health to a national emergency, and by March 16 all states had declared a state of emergency or a public health emergency [26]. The federal-level public health emergency was renewed on July 23 for another 90 days [46]. Emergency declarations allow governors to exercise emergency powers, which can include activating emergency personnel and funds and adjusting regulations to improve health care access. Many of the additional mitigation policies have been enacted at the state level, including school closures, large gathering bans, non-essential business closures, stay-at-home orders, bar/restaurant limits, and primary election postponements. The definition of "essential" businesses varies between states. For example, pharmacies, supermarkets, and hardware stores are generally categorized as essential, and museums and casinos are usually regarded as non-essential, states differ in whether they classify hospitality businesses and firearms retailers as essential.

Fig. 9 illustrates when states implemented five types of policies: declaring a state of emergency, the closure of non-essential businesses, re-opening of non-essential businesses, the introduction of mask mandates for all individuals, and the re-closure of some non-essential businesses. The figure visually demonstrates how the US government has decided to manage the crisis: by having states determine the content and timing of policy implementation. While the declaration of a state of emergency was made within a two-week period for nearly all states, 11 states did not implement a strict closure of non-essential business at all and the re-opening of businesses throughout the states has been stretched over six weeks. As of early August, only six states had begun to re-close businesses, although many had "paused" re-opening [47].

Public tension regarding re-opening

April saw a surge in protests urging officials to re-open the economy, including some armed protests and demonstrators supporting misstatements such as COVID-19 being no more dangerous than the seasonal flu [48]. These protests and the backlash against them have been representative of a larger divide between parts of the country wanting to lift public health measures to reduce their immediate damage to the economy and keeping public health measures in place. This conflict can also be observed between the national government and states, for example: The Trump Administration has publicly supported the re-opening movements by

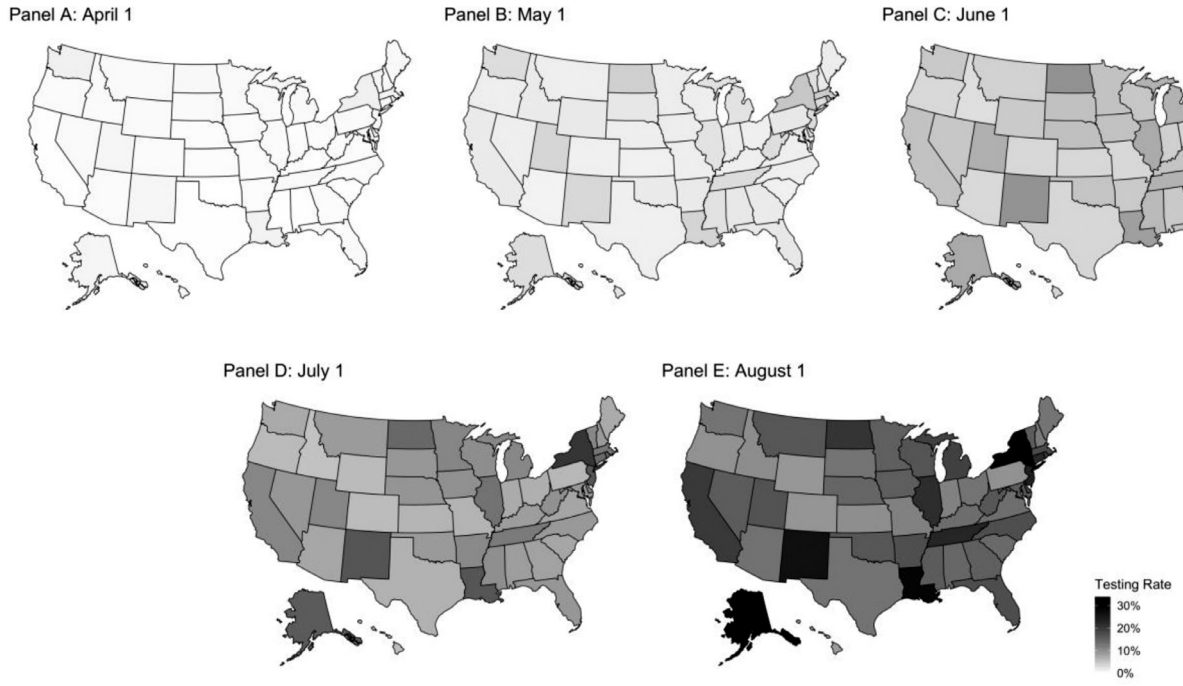

Fig. 7. Testing rates April 1, 2010 – August 1, 2020.

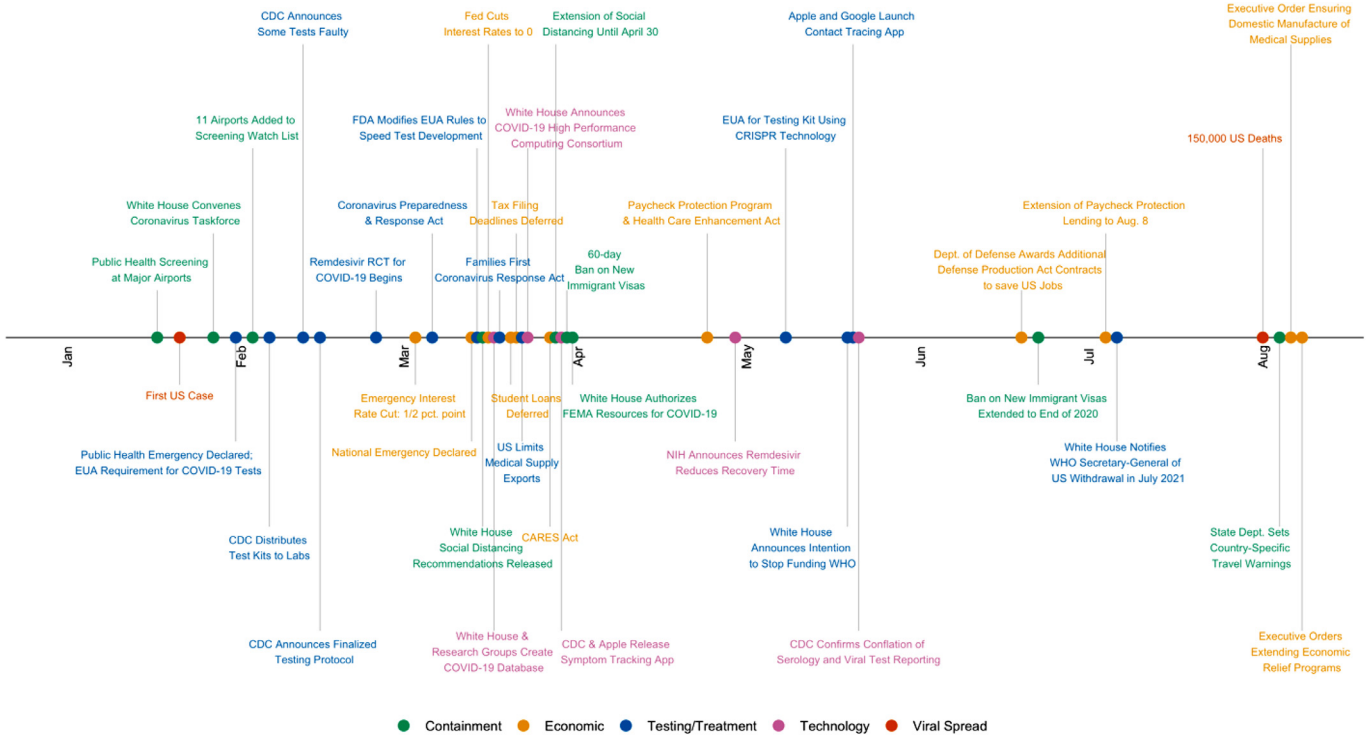

Fig. 8. Timeline of COVID-19 National US Policy Response.

declaring that all states have enough resources to lift restrictions, a claim which several governors from both major parties have disagreed with [49].

In early May the White House issued a general plan according to which states and local officials could orient themselves to have a structured approach to exit their versions of lockdowns [50]. The plan shares similarities with New Zealand's strategy in that it recommends a certain number of restrictions according to the risk level. Unlike New Zealand's approach, the White House proposal does not contain clear guidance regarding levels of disease transmission or how to measure a "downward trajectory" of cases.

Mask mandates

Mask mandates have been implemented in two waves: The first group of states introduced mandates around the same time as re-opening businesses, and the second group began introducing

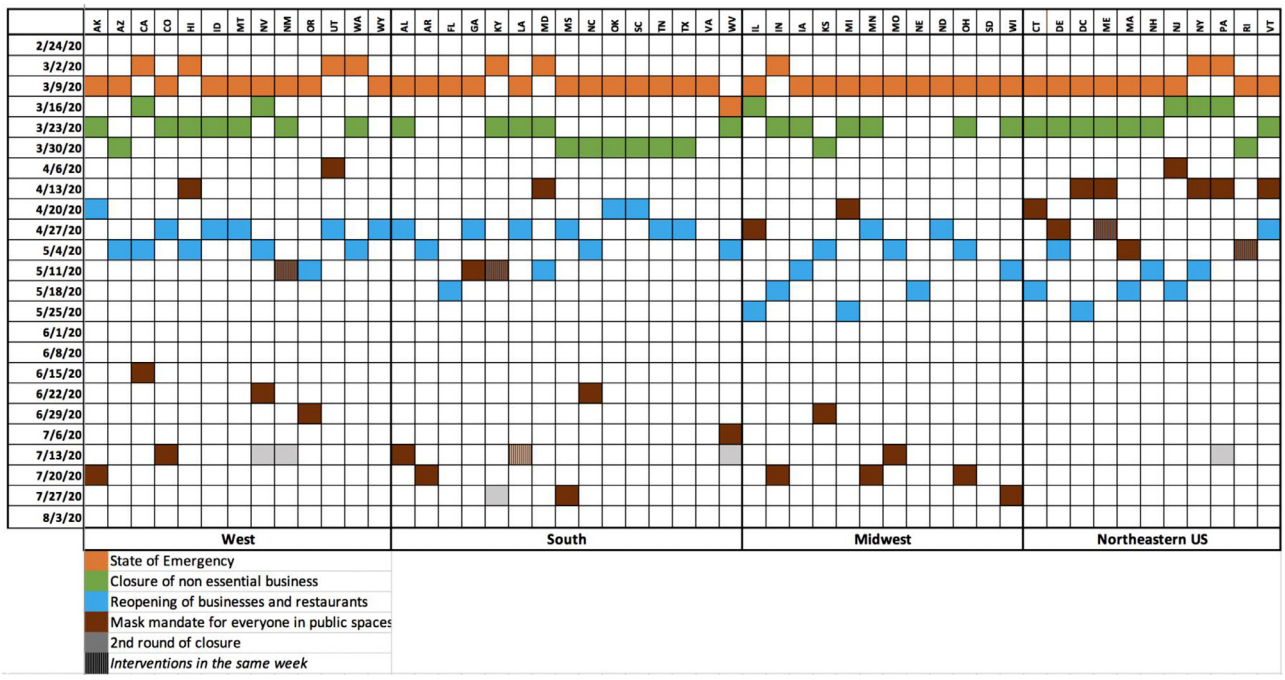

Fig. 9. Mitigation policies by state.

mandates around mid-June (Fig. 9). As of early August, just over half of states require individuals to wear a mask in public, although in some states without a state-wide mandate local authorities have mask wearing ordinances [51]. Northeastern states implemented mask mandates earlier than other regions of the country – likely related to the severity of the initial New York outbreak. Arizona and Florida were experiencing severe outbreaks by early August and no state-wide mask mandates in place; in contrast, Louisiana, which also had a spike in cases over the summer, instituted a mask mandate and re-closing of businesses in the same week in mid-July. In addition to varying by region, mask use varies at the local level, even within neighborhoods [52]. Self-reported rates of mask-wearing have improved over the course of the pandemic, increasing from 62% in April to 80% in July [52,53]. The variation in adoption of mandates to wear a mask and adherence to such mandates may in part be related to the topic being highly politicized [54] and scientific controversy [55]. On July 20, President Trump, who had previously been publicly skeptical about mask wearing, tweeted that the use of masks was "patriotic;" in the two weeks following, six additional states implemented a mask mandate (Fig. 9, [55,56]).

Mitigation policies in institutionalized contexts

In addition to the high prevalence of comorbidities of incarcerated populations, jails and prisons introduce further risk factors for COVID-19 spread [57]. Policies to address these risk factors include reducing the incarcerated population overall, decreasing barriers to seeking medical attention, and reducing outside contact through the limitation of visits [58,59]. LTC and nursing facilities have adopted similar measures. Many states have taken to recommending or completely prohibiting visitations, screening nursing home staff, and requiring the use of PPE to reduce the spread of COVID-19 in such facilities [60]. Although the Trump Administration plans to allocate funding for combating COVID-19 to nursing facilities based on quality ratings, a higher rate of COVID-19 cases in nursing homes is not associated with quality rating but is associated with large facility size, urban location, and a greater percentage of Black residents [61,62].

Table 6
Cost-benefit tradeoffs of a 30-day shutdown.

Life Value	Economic Loss	Health Benefit
$50,000/QALY	$416 billion	$151 billion
$150,000/QALY	$416 billion	$453 billion
$7.4 million/VSL	$416 billion	$2 trillion

Notes: Calculations are based on US annual GDP of $20 trillion and the following assumptions: 25% reduction to GDP from a comprehensive lockdown [63]; COVID-19 death estimations of 2.2 million over 250 days with no lockdown mitigation [65]; COVID-19 victims lose approximately 11 years of life; QALY from ICER [66]; VSL value from EPA [67].

Balancing human safety and economic recovery

As many states have been forced to pause or reverse their reopening plans and are experiencing such high prevalence rates that lockdowns remain an important policy tool for containing the spread, it is important to analyze the tradeoffs between the health and economic costs of lockdown. Table 6 demonstrates a range of cost-benefit tradeoffs of a comprehensive 30-day economic shutdown. In all scenarios the economic loss is equivalent, calculated based on the assumption that a lockdown reduces GDP by 25%; this assumption is a conservative comparator because economic loss is likely even in the absence of a strict lockdown [63]. The health benefit varies by the dollar value assigned to life; while explicit cost-effectiveness analyses of health interventions is often not considered by US policymakers (for example, the Affordable Care Act explicitly forbids Medicare from using cost-per-QALYs or similar measures when making coverage decisions [64]), the Institute for Clinical and Economic Review (ICER) and the Environmental Protection Agency (EPA) both provide benchmark values for cost-benefit analyses. The first two rows of Table 6 use the minimum and maximum QALY values from ICER, while the final row uses the EPA's suggested default Value of Statistical Life (VSL). A comprehensive shutdown for 30 days results in a roughly $416 billion loss, but a $453 billion benefit when using $150,000/QALY, the middle scenario in terms of life value assignment.

Table 7
CARES act funding allocations.

Group	Funding (Billions, USD)
Individuals	560
Small Businesses	377
Large Corporations	500
State/Local Government	340
Health Care	135
Education	43

Economic policy

The major components of US economic policy response have occurred at the federal level and include a series of large stimulus bills and Federal Reserve actions. The first two stimulus acts, Coronavirus Preparedness and Response Supplemental Appropriations Act and Families First Coronavirus Response Act, provided $8.3 and $192 billion respectively for health policy measures and are described in more detail in Section 4.3 below.

On March 27, the Coronavirus Aid, Relief and Economic Security (CARES) Act provides $2.2 trillion in funds for individuals, small businesses, large corporations, state and local governments, and other public health measures [68]. Table 7 broadly outlines the funding allocations. The individual relief included $1,200 cash payments per person and unemployment payments of $600/week in addition to base amounts paid by states for a period of four months. Of the small business funding, $350 billion went to the Small Business Administration for providing loans via the Paycheck Protection Program. In health care, hospitals were allocated $100 billion, community health centers $1.3 billion, and the CDC $4.3 billion. Colleges and universities received $14 billion, while K-12 schools were allocated $13.5 billion. The CARES Act also extended student loan relief to defer all loan and interest payments through September 30 without penalties for federally owned student loans.

The Paycheck Protection Program funds were depleted in a matter of days, leading to the passage of the Paycheck Protection Program and Health Care Enhancement Act (PPPHCEA, or "CARES Act 3.5") on April 24 [69]. The PPPHCEA replenished the funding from the CARES Act with an additional $321 billion for the Paycheck Protection Program. The bill also included an additional $60 billion for emergency loans and grants, and a new $25 billion fund for COVID-19 testing.

In addition to the stimulus bills, the Treasury Department announced on March 20 that the federal tax filing deadline would be moved from April 15 to July 15; by April 1, most states had also pushed back their state filing deadlines [70]. On March 3, the Federal Reserve cut interest rates by 0.5 percent, and on March 15 the Federal Reserve performed another emergency cut of 1 percent to effectively cut interest rates to zero [71]. The Federal Reserve also announced a plan to buy at least $700 billion in Treasury Bills and mortgage-backed securities (a "quantitative easing" program similar to that implemented to address the 2008 recession) [72].

As of the August recess, Congress had not reached agreement on a new coronavirus relief bill, and the additional unemployment benefit of $600/week expired on July 31. Although the Congress failed to pass any new bills before recessing, on August 9 President Trump signed four executive actions to help provide temporary economic relief: an enhanced unemployment benefit of $300/week, a moratorium on some evictions, extending the suspension on student loan repayments, and deferring payroll taxes [73]. However, it is unclear that the president has the authority to unilaterally mandate the first three actions, and the last – deferring payroll taxes – may result in a substantial administrative burden for employers [74].

Health policy

CMS has led many of the regulatory changes regarding coverage and capacity.[3] These changes have included allowing ambulatory surgery centers to bill as hospitals, physician-owned hospitals to temporarily increase capacity, the expansion of scope of practice for nurses and physicians assistants to perform orders without a physician's signoff, and allowing physicians to practice across state lines during the national emergency period [75]. CMS also waived cost-sharing for COVID-19 tests and treatments and removed prior authorization requirements [76]. Additionally, elective surgeries and non-essential medical and dental procedures have been recommended to be delayed until after the COVID-19 public health emergency [77].

Regarding telehealth policies and coverage, CMS has added more than 80 services to the Medicare telehealth benefit and increased reimbursement to the same rates as in-person visits. Many private payers have announced zero co-pay telemedicine for their members in the short term [78]. At the state-level, several Medicaid programs have expanded their coverage to include telehealth [79].

Many states activated emergency-response licensure laws that allow volunteers from other states to come and practice without a state-specific professional license; 18 states have enacted Uniform Emergency Volunteer Health Practitioner Act legislation, and over 30 states participate in a nurse-specific licensing exchange compact [80]. Additionally, some state governors have taken executive action to allow retired nurses and doctors and medical and nursing students temporary eligibility to practice, and to temporarily expand student and nurse scope of practice laws [81].

The first major COVID-19 bill passed by Congress, the Coronavirus Preparedness and Response Supplemental Appropriations Act, provided $8.3 billion in emergency funding for response to the COVID-19 outbreak [82]. The Office of the Secretary for Health and Human services received $3.1 billion of this funding, which is available until 2024; $950 million was dispersed to state and local health departments by the CDC; and $300 million was allocated to vaccine and treatment purchase. On March 18, Families First Coronavirus Response Act (FFCRA) was signed into law [83]. As the primary federal legislation on health policy, the FFCRA addresses paid sick leave, insurance coverage for COVID-19 testing and treatment, and unemployment benefits. Specifically, FFCRA allows employees to take up to 12 weeks of sick-leave when under lockdown, in state-ordered self-isolation, and when seeking testing for COVID-19 or up to two weeks at partial pay when having to take care of someone due to COVID-19. Companies with fewer than 500 employees are covered completely by the FFCRA, while smaller employers with less than 50 employees may be exempt from providing leave for parents due to school closure [84]. Further, health plans are required to cover costs at no additional co-payments at no additional cost, to reduce any disincentives of getting tested or treated for COVID-19. This includes uninsured individuals which may be covered by Medicaid for COVID-19 testing and treatment [26].

Technology policy

The CARES Act allocated $945 million to the National Institutes of Health (NIH), the leading health research organization and funding body in the US. In addition to calling for special addendums to existing grants to address COVID-19, the NIH launched a new rapid

[3] In US health policy, it is often the case that when CMS makes payment changes in the Medicare program, private payers follow suit (see, for example, Clemens and Gottlieb 2017 [141]).

test development program on April 29, Rapid Acceleration of Diagnostics. This initiative will award $500 million for development of early stage technologies on developing rapid and widely accessible COVID-19 tests [85]. Although the US is improving on testing rates as shown in Figs. 4 and 6, result turnaround times greatly increased. In late July, the two largest national commercial test labs, Quest and LabCorp, reported wait times for priority patients (hospitalized individuals and frontline health care workers) were longer than two days, and between one to two weeks for non-priority patients [86,87]. While new testing technology is being developed, the idea of performing pooled testing has gained ground as a solution for making better use of existing testing facilities and supplies [88]. Nebraska implemented a pooled testing program after running low on the reagent used in molecular tests; the state has since halted the program after a spike in positive cases rendered the approach inefficient [89]. The FDA granted both Quest and LabCorp certifications to perform pooled testing in late July, but the method is most efficient in settings with lower prevalence and it requires rapid turnaround of results to be effective [90–92].

In addition to testing, the US has also fast-tracked vaccine development, spurring high ranking officials such as the country's leading public health official, Dr. Anthony Fauci, to say that a vaccine may be available for the US population as soon as January 2021 [93]. To do so the government introduced 'Operation Warp Speed', which will fund the production of vaccines while they are still being tested for efficacy and safety – trading off the speed at which the vaccine will be disseminated against a wasteful investment in all the vaccine candidates which do not pass efficacy and safety standards [94]. Of five vaccines listed in phase III trials on the London School of Hygiene and Tropical Medicine vaccine tracker, one is being developed by an US American producer [95]: The company Moderna is currently recruiting 30,000 participants for trials for effectiveness and safety of the potential vaccine [96].

Early in the pandemic, tracking apps were appraised as one of the principal ways to mitigate infection spread, and several countries which are combating the virus successfully (e.g., Singapore and South Korea) have supported the use of such apps [97]. Although there are efforts from universities such as Stanford (Covid Watch) and MIT (Safe Paths), there is no endorsement on a national government level for any of the initiatives. Instead, states have been left to decide which application to adopt, if any [98]. Several states have endorsed the app developed by the cooperation of Google and Apple, while for example Utah decided to develop their own app [99] and at least 17 states have stated that no plans were made to use smartphone-based contact tracing [100]. Some states, including California, have also opted to train teams of individuals to perform manual contact tracing [101].

Health care system response

Although there are not yet systematic national data available, some primary care practices are reporting reductions in use of services up to 70% [102]. Similarly, there are reports of elective procedures and care declining across the country by up to 50% and emergency department visits dropping by 42% compared to the year 2019 [103,104]. Despite the demand in some areas of the country for medical professionals, this corresponds to reduced staffing: employment in health care declined by an estimated 43,000 from mid-February through mid-March [104]. This reduction in use of services was highest in late March, where ambulatory visits were 60% lower in the whole country than they were in prior years. Starting April ambulatory visits began to increase again before plateauing around a level which was 10% lower than in the previous years in early June [105]. It is likely that many smaller and rural hospitals will close, even with extra funds from the federal government, and some smaller primary care practices may not be able to financially weather the outbreak [106]. It is uncertain how much of the demand for elective or preventive care will be deferred to later in the year or even 2021, and what the expenditure consequences will be [107].

Although the data transparency issues surrounding hospitalizations make it difficult to obtain a comprehensive picture of US health care facility capacity, anecdotes from early, hard-hit areas, such as New York City, make it clear that some hospitals and health care systems were forced to turn away patients and triage patients by symptoms [108]. However, it appears that early concerns about ventilator shortages were not realized because of the implementation of national ventilator sharing schemes, and an increase in ventilator production [109,110]. The abundance of ventilators has led the Trump Administration to send ventilators to countries in need via USAID [111]. While this plan may be well-intended, the execution of it shows serious flaws, such as the lack of a needs-assessment or regard for the capabilities of countries to use and maintain the machines [106].

The combination of improving coverage and loosening regulations for telehealth and the recommendations to defer in-person non-emergency health care led to the increase in telehealth visits during the pandemic. Teladoc, one of the leading American telehealth providers, expects to see between 8 and 9 million visits in 2020, compared to 4.1 million 2019. Between January and March Teladoc had 2 million visits, and over 60% of these were from new

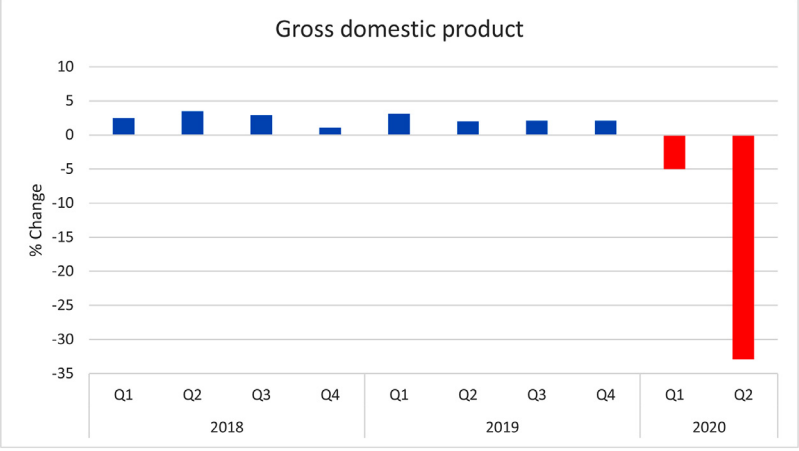

Fig. 10. Gross domestic product, 2018 – Q2 2020.

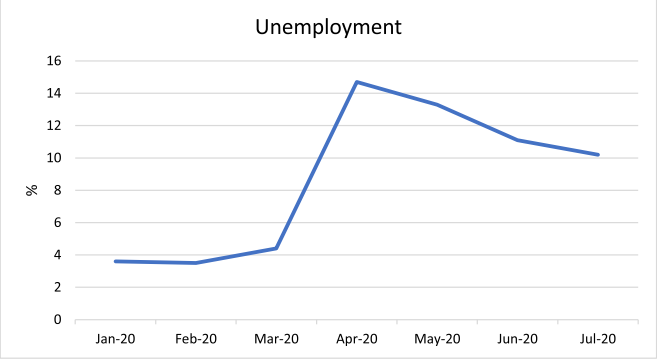

Fig. 11. US unemployment rate January to July 2020.

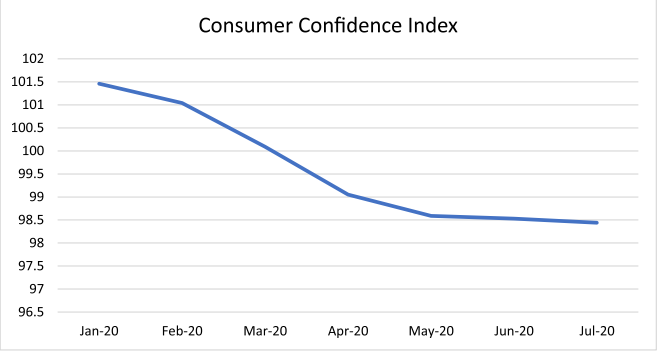

Fig. 12. US consumer confidence index January to July 2020.

users [112]. Individual health care systems are also reporting increases in telehealth usage. For example, NYU Langone Health, operating at the epicenter of the US outbreak in New York City, experienced an increase in tele-visits for urgent care from 102 per day to 802 per day between March 2 and April 14 [113].

Next to the overall decrease in reported cases of physical disease there have been concerns over increases in mental health problems as well as domestic abuse. [114]. Mental health conditions are likely to be amplified through the additional stress and social isolation that the virus and the pandemic bring, including exacerbating the existing opioid epidemic [115,116]. Drug deaths have risen by an average of 13% in 2020 compared to 2019 [117], and survey results from late March show that nearly half of Americans say the coronavirus has had a negative impact on their mental health [118]. While tele-therapy may help to alleviate some of this burden, there are particular concerns about a coming mental health crisis for health care workers and for children and adolescents [119–121]. Regarding domestic abuse, some cities are reporting increases in calls and text messages to domestic violence hotlines, while others are seeing declines, possibly due to safety concerns about calling while in the same space as an abuser [122]. In April, phone calls and texts to the National Child Abuse Hotline increased by 17 percent compared to the same time in 2019 [114].

Economic and financial market response

Mitigation efforts such as stay-at-home orders and non-essential business shutdowns severely impacted the US economy and financial markets, particularly between January and May. In June and July, the effect of re-opening and fiscal stimulus policies can be seen; below we highlight some major economic and fiscal performance indicators.

The first quarter of 2020 saw a 4.8 percent decrease in US GDP, and the second quarter saw an even more dramatic decline of nearly 33 percent (Fig. 10; [123]). In their summer report, the Bureau of Economic Analysis noted that exports decreased by 15.7 percent and imports by 14.2 percent in June 2020 compared to the year prior [124].

In April, US unemployment reached an official peak of 14.7%, 10 percentage points higher than in March, (Fig. 11), and an estimated 30% of Americans either lost a job or took a pay cut due to COVID-19 [125,126]. Based on a survey of businesses and households, the Bureau of Labor Statistics (BLS) reported that US unemployment fell to 13.1% in May; the BLS counts individuals receiving pay under the Payroll Protection Program and individuals furloughed but not receiving pay as employed – accounting for this misclassification, the unemployment rate for May would be closer to 19% [127,128]. However, after correcting for this classification

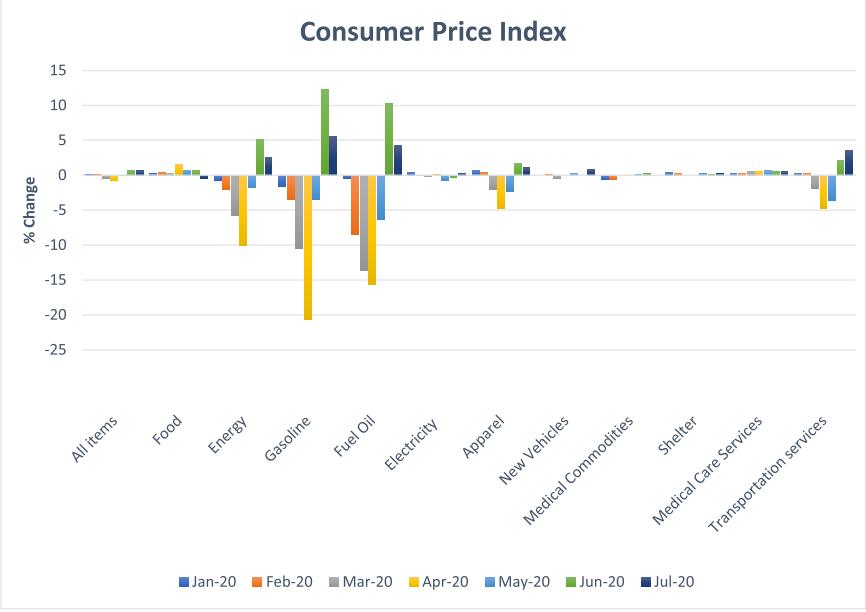

Fig. 13. US consumer price index January to July 2020.

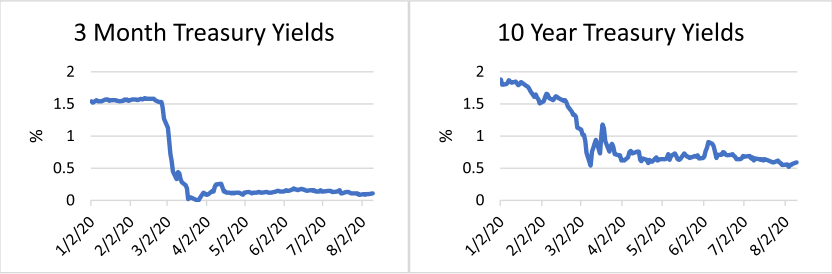

Fig. 14. 3-month and 10-year treasury yields.

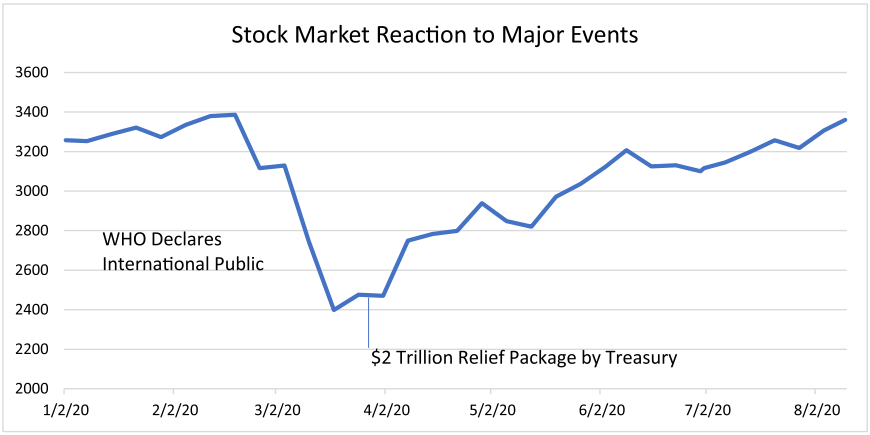

Fig. 15. S&P 500 trends January – August 2020.

error, the unemployment rate in June did improve to 11% after adding 4.8 million jobs as states began to re-open businesses. The recovery slowed in July, where the unemployment rate was 10%. Accordingly, as the unemployment rate steadily increased and the economic circumstances of many Americans became uncertain, the consumer confidence index declined from January to May and then flattened in June and July (Fig. 12; [129]).

During the pandemic, the price of goods and services generally decreased between January and May, and then increased in June and July, (Fig. 13; [130]). However, not all commodities decreased in price. Consumer prices of food increased almost 2 percentage points from January to April 2020 before slowing to a one percentage point increase in May and June, while other commodities such as medical care services, electricity, and education, increased by less than 1 percentage point during this period . As the Consumer Price Index (CPI) decreased, the inflation rate also decreased, beginning the year at 2.5 percent and down to 0.3 percent in April, and then rebounding again by 0.6 percent in June and 1 percent in July [131].

Fig. 14 displays the trends in 3-month (Panel A) and 10-year (Panel B) treasury yields, which sharply declined in March [132]. Lastly, Fig. 15 demonstrates the stock market trends during the pandemic, which declined once the virus reached the US and began to rebound after the $2 trillion CARES Act relief package was signed into law, and by August recovered the 2020 losses [41,133].

Conclusion

For the remainder of the pandemic the OECD has described four key measures which health care systems should implement: i) ensuring access of the vulnerable to diagnostics and treatment; ii) improving health systems delivery for rapid response to outbreaks; iii) increase the availability of digital solutions and data to improve surveillance and care; and iv) invest in research and development for accelerated production of diagnostics, treatments, and vaccines [134]. These elements have all been partially addressed by the policies described in this paper. The US is falling most behind regarding surveillance and equitable access to treatment and care. Arguably the most effective areas of US policy response have been in economic stimulus, the change in regulations around telemedicine, and the increased funding for scientific research via the NIH.

The heterogeneous policy response is rooted in the American federalist tradition, and while it poses challenges to effectively containing infection spread, it also allows states to tailor responses that may be more appropriate for the local context. Although there are institutional barriers to implementing stronger, more centralized responses, there are also legitimate privacy and ethics questions regarding technology solutions such as phone tracing and credit card monitoring, and the arguments regarding the economic and public health consequences of continued strict shelter-in-place orders should be carefully considered. The nation-wide protests sparked by the police murders of Black Americans have raised concerns regarding the spread of COVID-19, but these have been countered by the framing of systemic racism and white supremacy as a public health issue in its own right that has contributed to the disproportionate burden of COVID-19 cases and deaths in Black communities [135,136]. Research using mobile phone data and public health experts suggest the increase in cases over the summer is unlikely to have been caused by the protests [137,138]. However, as discussed in previous sections, the decisions re-open businesses and the economy before establishing adequate surveillance and containment programs is the more likely source of increased spread.

The health policy and technology response in the US has been highly decentralized and fractured both politically and in terms of public sentiment. Future management of the pandemic will depend greatly on the outcome of the November 2020 presidential and congressional elections.

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References

[1] Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. JAMA [Internet] 2020;323(20):2052. [cited 2020 Aug 11] Available from: https://jamanetwork.com/journals/jama/fullarticle/2765184.

[2] Public Health England. Disparities in the risk and outcomes of COVID-19 [Internet]. London; 2020 [cited 2020 Aug 11]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/908434/Disparities_in_the_risk_and_outcomes_of_COVID_August_2020_update.pdf.

[3] Division UNS. UNData: United States [Internet]. United Nations. 2020 [cited 2020 Jun 9]. Available from: https://data.un.org/en/iso/us.html.

[4] United States Census Bureau. Population estimates show aging across race groups differs [Internet]. US Census Newsroom [cited 2020 Jun 9]. Available from:https://www.census.gov/newsroom/press-releases/2019/estimates-characteristics.html.

[5] Indian Health Service. Disparities | Fact Sheets [Internet]. [cited 2020 Jun 9]. Available from: https://www.ihs.gov/newsroom/factsheets/disparities/.

[6] Centers for Disease Control and Prevention. Chronic diseases in America | CDC [Internet]. [cited 2020 Jun 9]. Available from: https://www.cdc.gov/chronicdisease/resources/infographic/chronic-diseases.htm.

[7] Centers for Disease Control and Prevention. National diabetes statistics report 2020. Estimates of diabetes and its burden in the United States. 2020.

[8] Million Hearts Department of Health and Human ServicesEstimated Hypertension Prevalence, Treatment, and Control Among U.S. Adults [Internet]. Data Rep 2020. [cited 2020 Aug 11]. Available from: https://millionhearts.hhs.gov/data-reports/hypertension-prevalence.html.

[9] Centers for Disease Control and Prevention. FastStats - Overweight Prevalence [Internet]. [cited 2020 Jun 9]. Available from: https://www.cdc.gov/nchs/fastats/obesity-overweight.htm.

[10] OECD. Health - OECD Data [Internet]. [cited 2020 Jun 9]. Available from: https://data.oecd.org/health.htm.

[11] Proctor BD, Semega JL, Kollar MA. Income and poverty in the United States: 2015 [Internet]. Current Population Reports, Vol 256; 2016. [cited 2020 Jun 9]. Available from: https://www.census.gov/library/publications/2019/demo/p60-266.html.

[12] Chetty R, Stepner M, Abraham S, Lin S, Scuderi B, Turner N, et al. The association between income and life expectancy in the United States, 2001-2014. JAMA - J Am Med Assoc 2016;315(16):1750–66.

[13] Batalova J, Blizzard B, Bolter J. Frequently Requested statistics on immigrants and immigration in the United States | migrationpolicy.org [Internet]. 2020 [cited 2020 Jun 9]. Available from: https://www.migrationpolicy.org/article/frequently-requested-statistics-immigrants-and-immigration-united-states.

[14] Wagner P, Sawyer W. States of incarceration: the global context 2018 | Prison Policy Initiative [Internet]. Prison Policy Initiative 2020. [cited 2020 Jun 9]. Available from: https://www.prisonpolicy.org/global/2018.html.

[15] Kaiser Family Foundation Total number of residents in certified nursing facilities [Internet]. Kaiser Family Foundation State Health Facts; 2017. [cited 2020 Jun 9]. Available from: https://www.kff.org/other/state-indicator/number-of-nursing-facility-residents/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

[16] HHS.GOV/OPIOIDS About the epidemic | HHS.gov [Internet]. US Department of Health and Human Services; 2019. [cited 2020 Jun 9]. Available from: https://www.hhs.gov/opioids/about-the-epidemic/index.html.

[17] Pitt AL, Humphreys K, Brandeau ML. Modeling health benefits and harms of public policy responses to the US opioid epidemic. Am J Public Health 2018;108(10):1394–400.

[18] Centers for Disease Control and PreventionFastStats - leading causes of death [Internet]. Centers Dis Control Prevent 2017. [cited 2020 Jun 9]. Available from: https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm.

[19] Papanicolas I, Woskie LR, Jha AK. Health care spending in the United States and other high-income countries. JAMA 2018;319:1024–39 American Medical Association.

[20] Holgash K, Heberlein M. Physician acceptance of new medicaid patients: what matters and what doesn't [Internet]. Health Affairs Blog 2019. [cited 2020 Aug 11]. Available from: https://www-healthaffairs-org.libproxy.berkeley.edu/do/10.1377/hblog20190401.678690/full/.

[21] Peterson-Kaiser Family FoundationOut-of-pocket spending [Internet]. Health Syst Tracker 2020. [cited 2020 Aug 11]. Available from: https://www.healthsystemtracker.org/indicator/access-affordability/out-of-pocket-spending/.

[22] American Hospital Association. Fast facts on US hospitals [Internet]. 2020 [cited 2020 Aug 11]. Available from: https://www.aha.org/statistics/fast-facts-us-hospitals.

[23] Popescu I, Fingar KR, Cutler E, Guo J, Jiang HJ. Comparison of 3 safety-net hospital definitions and association with hospital characteristics. JAMA Netw Open 2019;2(8):198577. [Internet][cited 2020 Aug 11] Available from: https://jamanetwork.com/.

[24] Rama A. Policy research perspectives how are physicians paid? A detailed look at the methods used to compensate physicians in different practice types and specialties. 2018.

[25] OECD. Doctors (indicator) [Internet]. 2020 [cited 2020 Jun 9]. p. Accessed 21 January 2020. Available from: https://data.oecd.org/healthres/doctors.htm#indicator-chart.

[26] Kaiser Family FoundationState data and policy actions to address Coronavirus | KFF [Internet]. Kaiser Family Found 2020. [cited 2020 Jun 9]. Available from: https://www.kff.org/health-costs/issue-brief/state-data-and-policy-actions-to-address-coronavirus/#stateleveldata.

[27] Halpern NA, See Tan K. SCCM | United States resource availability for COVID-19 [Internet]. Soc Crit Care Med 2020. [cited 2020 Jun 10]. Available from: https://sccm.org/Blog/March-2020/United-States-Resource-Availability-for-COVID-19.

[28] American Telemedicine Association. 2019 State of the states report: coverage and reimbursement. 2019; Available from: https://cdn2.hubspot.net/hubfs/5096139/Files/Thought_Leadership_ATA/2019_State_of_the_States_summary_final.pdf.

[29] Madrigal AC, Meyer R. The CDC and States are misreporting COVID-19 test data. Atlantic [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.theatlantic.com/health/archive/2020/05/cdc-and-states-are-misreporting-covid-19-test-data-pennsylvania-georgia-texas/611935/.

[30] Centers for Disease Control and PreventionCDC COVID Data Tracker [Internet]. Cent Dis Control Prevent 2020. [cited 2020 Jun 9]. Available from: https://www.cdc.gov/covid-data-tracker/index.html.

[31] Centers for Disease Control and PreventionCOVID-19 provisional counts - weekly updates by select demographic and geographic characteristics [Internet]. Cent Dis Control Prevent 2020. [cited 2020 Jun 9]. Available from: https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm.

[32] Stolberg SG. Trump administration strips C.D.C. of control of coronavirus data. The New York Times [Internet] 2020. [cited 2020 Aug 12]; Available from: https://www.nytimes.com/2020/07/14/us/politics/trump-cdc-coronavirus.html.

[33] covidexitstrategy.org. Continued ICU & inpatient bed data issues & inconsistencies from HHS [Internet]. Tracking our COVID-19 response. 2020 [cited 2020 Aug 12]. Available from: https://www.covidexitstrategy.org/.

[34] Ladyzhets Glassman R. Hospitalization data reported by the HHS vs. the States: jumps, drops, and other unexplained phenomena [Internet]. COVID Track Project Blog 2020. [cited 2020 Aug 12]. Available from: https://covidtracking.com/blog/hospitalization-data-reported-by-the-hhs-vs-the-states-jumps-drops-and-other.

[35] C for SS and E (CCSE) at Johns Hopkins UniversityCOVID-19 data repository [Internet]. GitHub 2020. [cited 2020 Jun 9]. Available from:. https://github.com/CSSEGISandData/COVID-19.

[36] CovidTracking.comThe COVID tracking project | the COVID tracking project [Internet]. Atlantic Monthly Group 2020. [cited 2020 Jun 9]. Available from: https://covidtracking.com/.

[37] CMS.gov. Upcoming requirements for notification of confirmed COVID-19 (or COVID-19 persons under investigation) among residents and staff in nursing homes | CMS [Internet]. CMS.gov. 2020 [cited 2020 Jun 9]. Available from: https://www.cms.gov/medicareprovider-enrollment-and-certificationsurveycertificationgeninfopolicy-and-memos-states-and/upcoming-requirements-notification-confirmed-covid-19-or-covid-19-persons-under-investigation-among.

[38] Proctor J. Rules and regulations [Internet]. Federal Register 2020;85. [cited 2020 Jun 9]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/.

[39] Data.CMS.gov. COVID-19 Nursing Home Data | Data.CMS.gov [Internet]. Data.CMS.gov. 2020 [cited 2020 Jun 9]. Available from: https://data.cms.gov/stories/s/COVID-19-Nursing-Home-Data/bkwz-xpvg.

[40] Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, et al. First case of 2019 novel coronavirus in the United States. N Engl J Med [Internet] 2020;382(10):929–36. [cited 2020 Jun 9] Available from: http://www.nejm.org/doi/10.1056/NEJMoa2001191.

[41] World Health Organization. Novel Coronavirus (2019-nCOV) Situation Report - 1 [Internet]. 2020 [cited 2020 Jun 9]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200121-sitrep-1-2019-ncov.pdf?sfvrsn=20a99c10_4.

[42] William D. Contamination at CDC lab delayed rollout of coronavirus tests. The Washington Post [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.washingtonpost.com/investigations/contamination-at-cdc-lab-delayed-rollout-of-coronavirus-tests/2020/04/18/fd7d3824-7139-11ea-aa80-c2470c6b2034_story.html.

[43] Whoriskey P, Satija N. While CDC coronavirus tests stalled for six weeks, a German lab made 1.4 million tests. The Washington Post [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.washingtonpost.com/business/2020/03/16/cdc-who-coronavirus-tests/.

[44] DePillis L, Chen C. The FDA is forcing the CDC to waste time double testing some coronavirus cases. ProPublica 2020. [cited 2020 Jun 9]. Available from: https://www.propublica.org/article/the-fda-is-forcing-the-cdc-to-waste-time-double-testing-some-coronavirus-cases.

[45] Paz C. All of Trump's lies about the coronavirus. The Atlantic [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.theatlantic.com/politics/archive/2020/05/trumps-lies-about-coronavirus/608647/.

[46] Roubein R. Trump administration renews public health emergency after urging from states. Politico [Internet] 2020. [cited 2020 Aug 12]; Available from: https://www.politico.com/news/2020/07/23/trump-coronavirus-public-health-emergency-380799.

[47] Lee JC, Mervosh S, Avila Y, Harvey B, Leeds Matthews A. See how all 50 states are reopening (and Closing Again) [Internet]. The New York Times 2020. [cited 2020 Aug 17]. Available from: https://www.nytimes.com/interactive/2020/us/states-reopen-map-coronavirus.html.

[48] Jeffrey A. Coronavirus: scenes of protests across the country demanding states reopen the economy [Internet]. CNBC 2020. [cited 2020 Jun 11]. Available from: https://www.cnbc.com/2020/04/18/coronavirus-scenes-of-protests-across-the-country-demanding-states-reopen-the-economy.html.

[49] News Wires. "Delusional": US governors excoriate Trump's Covid-19 lockdown exit plan [Internet]. France24. 2020 [cited 2020 Jun 11]. Available from: https://www.france24.com/en/20200419-delusional-us-governors-excoriate-trump-s-covid-19-lockdown-exit-plan.

[50] The White House. Opening Up America Again [Internet]. [cited 2020 Jun 11]. Available from: https://www.whitehouse.gov/openingamerica/.

[51] Fernandez M. The states where face coverings are mandatory - Axios [Internet]. Axios Health 2020. [cited 2020 Jul 29]. Available from: https://www.axios.com/states-face-coverings-mandatory-a0e2fe35-5b7b-458e-9d28-3f6cdb1032fb.html.

[52] Katz J, Sanger-Katz M, Quealy K. A detailed map of who is wearing masks in the U.S. - The New York Times. New York Times [Internet] 2020. [cited 2020 Jul 29]; Available from: https://www.nytimes.com/interactive/2020/07/17/upshot/coronavirus-face-mask-map.html.

[53] Fisher KA, Barile JP, Guerin RJ, Vanden Esschert KL, Jeffers A, Tian LH, et al. Factors associated with cloth face covering use among adults during the COVID-19 pandemic — United States, April and May 2020. MMWR Morb Mortal Wkly Rep [Internet] 2020;69(28):933–7. [cited 2020 Jul 29] Available from: http://www.cdc.gov/mmwr/volumes/69/wr/mm6928e3.htm?s_cid=mm6928e3_w.

[54] Perry SL, Whitehead AL, Grubbs JB. Culture wars and COVID-19 conduct: Christian nationalism, religiosity, and americans' behavior during the coronavirus pandemic. J Sci Study Relig 2020.

[55] Iversen B, Vestrheim D. Should individuals in the community without respiratory symptoms wear facemasks to reduce the spread of COVID-19? Health (San Francisco). Norwegian Inst Public Health 2020:43.

[56] Breuninger K. Trump says coronavirus masks are "patriotic" after months of largely resisting wearing one. 2020.

[57] Woodall J, Freeman C. Promoting health and well-being in prisons: an analysis of one year's prison inspection reports. Crit Public Health 2019.

[58] Prison Policy InitiativeCriminal justice responses to the coronavirus pandemic | Prison Policy Initiative [Internet]. Prison Policy Initiative 2020. [cited 2020 Jun 9]. Available from: https://www.prisonpolicy.org/virus/virusresponse.html#copays.

[59] Dolovich S, Littman A, Nagai H, Cheng T, Choi J, DiLaura G, et al. UCLA Law Covid-19 Behind Bars Data Project <Professor Sharon Dolovich, Director>- Google Sheets [Internet]. UCLA PRison Law Policy Program 2020. [cited 2020 Jun 9]. Available from:https://docs.google.com/spreadsheets/d/1X6uJkXXS-O6eePLxw2e4JeRtM41uPZ2eRcOA_HkPVTk/edit#gid=1641553906.

[60] Grabowski DC, Mor V. Nursing home care in crisis in the wake of COVID-19. JAMA [Internet] 2020. [cited 2020 Jun 9]; Available from: https://jamanetwork.com/journals/jama/fullarticle/2766599.

[61] Abrams HR, Loomer L, Gandhi A, Grabowski DC. characteristics of U.S. nursing homes with <scp>COVID</scp>-19 Cases. J Am Geriatr Soc [Internet] 2020. [cited 2020 Jun 9];jgs.16661. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/jgs.16661.

[62] CMS.gov NewsroomTrump administration unveils enhanced enforcement actions based on nursing home COVID-19 data and inspection results | CMS [Internet]. CMS.gov Newsroom 2020. [cited 2020 Jun 9]. Available from: https://www.cms.gov/newsroom/press-releases/trump-administration-unveils-enhanced-enforcement-actions-based-nursing-home-covid-19-data-and.

[63] OECD. Evaluating the initial impact of COVID-19 containment measures on economic activity [Internet]. 2020 [cited 2020 Jul 29]. Available from: http://www.oecd.org/coronavirus/policy-responses/evaluating-the-initial-impact-of-covid-19-containment-measures-on-economic-activity-b1f6b68b/.

[64] Ne'eman A. Formulary restrictions devalue and endanger the lives of disabled people [Internet]. Health Affairs Blog 2018. [cited 2020 Aug 10]. Available from: https://www-healthaffairs-org.libproxy.berkeley.edu/do/10.1377/hblog20181025.42661/full/.

[65] Gt Walker P, Whittaker C, Watson O, Baguelin M, Ainslie KEC, Bhatia S, et al. Report 12: the global impact of COVID-19 and strategies for mitigation and suppression. [cited 2020 Jul 29]; Available from: https://doi.org/10.25561/77735.

[66] Whittington MD, Campbell JD. Alternative pricing models for remdesivir and other potential treatments for COVID-19 institute for clinical and economic review. 2020.

[67] US Environmental Protection Agency. Mortality Risk Valuation [Internet]. [cited 2020 Jul 29]. Available from: https://www.epa.gov/environmental-economics/mortality-risk-valuation#whatvaluehttps://www.epa.gov/environmental-economics/mortality-risk-valuation.

[68] Text - S.3548 - 116th Congress (2019-2020): CARES Act. S.3548 Mar 19, 2020.

[69] Text - H.R.266 - 116th Congress (2019-2020): Paycheck Protection Program and Health Care Enhancement Act. H.R.266 Apr 24, 2020.

[70] Internal Review ServiceTax Day now July 15: Treasury, IRS extend filing deadline and federal tax payments regardless of amount owed | Internal Revenue Service [Internet]. IRS News Release 2020. [cited 2020 Jun 13]. Available from: https://www.irs.gov/newsroom/tax-day-now-july-15-treasury-irs-extend-filing-deadline-and-federal-tax-payments-regardless-of-amount-owed.

[71] The Federal Reserve. Federal Reserve Board - Open Market Operations [Internet]. federalreserve.gov. 2020 [cited 2020 Jun 13]. Available from: https://www.federalreserve.gov/monetarypolicy/openmarket.htm.

[72] Liesman S. Federal Reserve cuts rates to zero and launches massive $700 billion quantitative easing program [Internet]. CNBC 2020. [cited 2020 Jun 13]. Available from: https://www.cnbc.com/2020/03/15/federal-reserve-cuts-rates-to-zero-and-launches-massive-700-billion-quantitative-easing-program.html.

[73] Schwartz MS, Keith T. In executive actions, Trump extends some unemployment benefits, defers payroll taxes. NPR [Internet] 2020. [cited 2020 Aug 13]; Available from: https://www.npr.org/2020/08/08/900516854/in-executive-actions-trump-extends-unemployment-benefits.

[74] Rubin R. Trump's payroll-tax deferral plans spur confusion. Wall Street J [Internet] 2020. [cited 2020 Aug 13]; Available from: https://www.wsj.com/articles/trumps-payroll-tax-deferral-plans-spur-confusion-11597318890.

[75] Trump Administration makes sweeping regulatory changes to help U.S. healthcare system address COVID-19 Patient Surge | CMS [Internet]. [cited 2020 Jun 9]. Available from: https://www.cms.gov/newsroom/press-releases/trump-administration-makes-sweeping-regulatory-changes-help-us-healthcare-system-address-covid-19.

[76] CMS Issues guidance to help medicare advantage and part D plans respond to COVID-19 | CMS [Internet]. [cited 2020 Jun 9]. Available from: https://www.cms.gov/newsroom/press-releases/cms-issues-guidance-help-medicare-advantage-and-part-d-plans-respond-covid-19.

[77] CMS Releases recommendations on adult elective surgeries, non-essential medical, surgical, and dental procedures during COVID-19 response | CMS [Internet]. [cited 2020 Jun 9]. Available from: https://www.cms.gov/newsroom/press-releases/cms-releases-recommendations-adult-elective-surgeries-non-essential-medical-surgical-and-dental.

[78] Augenstein J. Opportunities to expand telehealth use amid the coronavirus pandemic [Internet]. Health Affairs Blog 2020. [cited 2020 Jun 9]. Available from: https://www.healthaffairs.org/do/10.1377/hblog20200315.319008/full/.

[79] Weigel G, Ramaswamy A, Sobel L, Salganicoff A, Cubanski J, Freed M. Opportunities and Barriers for Telemedicine in the U.S. During the COVID-19 Emergency and Beyond | KFF [Internet]. Kaiser Family Foundation; 2020. [cited 2020 Jun 10]. Available from: https://www.kff.org/womens-health-policy/issue-brief/opportunities-and-barriers-for-telemedicine-in-the-u-s-during-the-covid-19-emergency-and-beyond/.

[80] Hentze I. COVID-19: occupational licensing during public emergencies [Internet]. National Conference of State Legislatures; 2020. [cited 2020 Aug 12]. Available from: https://www.ncsl.org/research/labor-and-employment/covid-19-occupational-licensing-in-public-emergencies.aspx.

[81] American Association of Nurse PractitionersCOVID-19 State Emergency Response: Temporarily Suspended and Waived Practice Agreement requirements [Internet]. State Advocacy 2020. [cited 2020 Aug 12]. Available from: https://www.aanp.org/advocacy/state/covid-19-state-emergency-response-temporarily-suspended-and-waived-practice-agreement-requirements.

[82] H.R.6074 - 116th congress (2019-2020): coronavirus preparedness and response supplemental appropriations act, 2020. H.R.6074 2020.

[83] Text - H.R.6201 - 116th Congress (2019-2020): families first coronavirus response Act. H.R. 6201 United States; 2020.

[84] Federal Register: Paid leave under the families first coronavirus response act [Internet]. [cited 2020 Jun 9]. Available from: https://www.federalregister.gov/documents/2020/04/06/2020-07237/paid-leave-under-the-families-first-coronavirus-response-act.

[85] National Insitutes of HealthNIH mobilizes national innovation initiative for COVID-19 diagnostics | National Institutes of Health (NIH) [Internet]. Natl Inst Health News Releases 2020. [cited 2020 Jun 14]. Available from: https://www.nih.gov/news-events/news-releases/nih-mobilizes-national-innovation-initiative-covid-19-diagnostics.

[86] Galewitz P. As COVID testing soars, wait times for results jump to a week — or more [Internet]. Kaiser Health News 2020. [cited 2020 Jul 29]. Available from: https://khn.org/news/as-covid-testing-soars-wait-times-for-results-jump-to-a-week-or-more/.

[87] Quest DiagnosticsQuest diagnostics media statement about COVID-19 testing [Internet]. Quest Media Newsroom 2020. [cited 2020 Jul 29]. Available from: https://newsroom.questdiagnostics.com/COVIDTestingUpdates.

[88] Buî Q, Kliff S, Sanger-Katz M. How to test more people for coronavirus without actually needing more tests - The New York Times. The New York Times [Internet] 2020. [cited 2020 Jul 29]; Available from: https://www.nytimes.com/interactive/2020/07/27/upshot/coronavirus-pooled-testing.html.

[89] Harris R. Pooled testing for coronavirus gets another look : shots - health news: NPR [Internet].. NPR Morning Ed 2020. [cited 2020 Jul 29]. Available from: https://www.npr.org/sections/health-shots/2020/07/06/886886255/pooling-coronavirus-tests-can-spare-scarce-supplies-but-theres-a-catch.

[90] FDACoronavirus (COVID-19) update: FDA issues first emergency authorization for sample pooling in diagnostic testing [Internet]. FDA News Release 2020. [cited 2020 Jul 29]. Available from: https://www.fda.gov/news-events/press-announcements/coronavirus-covid-19-update-fda-issues-first-emergency-authorization-sample-pooling-diagnostic.

[91] LabCorp. LabCorp receives authorization for COVID-19 Sample Pooling [Internet]. LabCorp Newsroom. 2020 [cited 2020 Jul 29]. Available from: https://www.labcorp.com/coronavirus-disease-covid-19/labcorp-newsroom/labcorp-receives-authorization-covid-19-sample-pooling.

[92] Augenblick N, Kolstad JT, Obermeyer Z, Wang A, Abuabara K, Barmack S, et al. Group testing in a pandemic: the role of frequent testing, correlated risk, and machine learning [Internet]. 2020 [cited 2020 Jul 29]. Available from: http://www.nber.org/papers/w27457.ack.

[93] Smith D. Trump unveils "warp-speed" effort to create coronavirus vaccine by year's end | US news | The Guardian. The Guardian [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.theguardian.com/us-news/2020/may/15/trump-coronavirus-warp-speed-vaccine-white-house.

[94] Jacobs J, Armstrong D. Trump coronavirus vaccine: "operation warp speed" project news - Bloomberg. Bloomberg [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.bloomberg.com/news/articles/2020-04-29/trump-s-operation-warp-speed-aims-to-rush-coronavirus-vaccine.

[95] LSHTM. COVID-19 vaccine development Timeline. 2020.

[96] NIHPhase 3 clinical trial of investigational vaccine for COVID-19 begins | National Institutes of Health (NIH). News Releases 2020.

[97] Howell O'Neill P, Ryan-Mosley T, Johnson B. A flood of coronavirus apps are tracking us. Now it's time to keep track of them. | MIT Technology Review [Internet]. MIT Technology Rev 2020. [cited 2020 Jun 9]. Available from: https://www.technologyreview.com/2020/05/07/1000961/launching-mittr-covid-tracing-tracker/.

[98] Leibrand S, Kakade S, Latta S, Lewis D, Tessaro S, Weyl G, et al. Outpacing the virus: digital response to containing the spread of COVID-19 while mitigating privacy risks. 2020.

[99] Gold H, Business CNN. What happened to all the coronavirus tracking apps? - CNN [Internet].. CNN Bus 2020. [cited 2020 Jun 9]. Available from: https://edition.cnn.com/2020/06/05/tech/coronavirus-tracking-apps/index.html.

[100] Holmes A, Langley H. Apple and Google's ambitious COVID-19 contact-tracing tech can help contain the pandemic only if used widely. But so far only 3 states have agreed — and none has started to use it. 2020.

[101] Office of Governor Newsom. Governor newsom launches California Connected – California's contact tracing program and public awareness campaign | California Governor [Internet]. CA.gov. 2020 [cited 2020 Jun 9]. Available from: https://www.gov.ca.gov/2020/05/22/governor-newsom-launches-california-connected-californias-contact-tracing-program-and-public-awareness-campaign/.

[102] Cutler D. How will COVID-19 affect the health care economy? JAMA Heal Forum 2020;1(4):e200419.

[103] Cutler DM, Nikpay S, Huckman RS. The Business of Medicine in the Era of COVID-19. In: JAMA - Journal of the American Medical Association, 323. American Medical Association; 2020. p. 2003–4.

[104] Hartnett KP, Kite-Powell A, Devies J, Coletta MA, Boehmer TK, Adjemian J, et al. Morbidity and mortality weekly report impact of the COVID-19 pandemic on emergency department visits-United States [Internet]. 2019 [cited 2020 Jun 9]. Available from: https://www.hhs.gov/about/agencies/iea/regional-offices/index.html.

[105] Mehrotra A, Chernew M, Linetsky D, Hatch H, Cutler D, Schneider E. Impact COVID on outpatient visits: changing patterns & hot spots | Commonwealth Fund. 2020.

[106] Scott D. Coronavirus's effect on health care, from coverage to vaccines - Vox [Internet]. Vox 2020. [cited 2020 Jun 9]. Available from: https://www.vox.com/the-highlight/2020/4/15/21211905/coronavirus-covid-19-pandemic-medical-health-care-hospitals.

[107] Cox C, Rudowitz R, Neuman T, Cubanski J, Rae M. How health costs might change with COVID-19 - Peterson-KFF Health System Tracker [Internet]. 2020 [cited 2020 Jun 9]. Available from: https://www.healthsystemtracker.org/brief/how-health-costs-might-change-with-covid-19/.

[108] Dwyer J. One Hospital Was Besieged by the Virus. Nearby Was 'Plenty of Space.'. The New York Times [Internet]. 2020. [cited 2020 Aug 17]; Available from: https://www.nytimes.com/2020/05/14/nyregion/coronavirus-ny-hospitals.html.

[109] Shepardson D, O'Donnell C. U.S. revs up ventilator production for coronavirus patients as need wanes. Reuters [Internet] 2020. [cited 2020 Aug 12]; Available from: https://www.reuters.com/article/us-health-coronavirus-ventilators/u-s-revs-up-ventilator-production-for-coronavirus-patients-as-need-wanes-idUSKBN22232Q.

[110] Mansfield E. Ventilator makers meet first deadline, deliver 4.4K amid coronavirus. USA Today [Internet] 2020. [cited 2020 Aug 12]; Available from: https://webcache.googleusercontent.com/search?q=cache:l9WWMyqee2YJ:https://www.usatoday.com/story/news/investigations/2020/05/06/ventilator-makers-meet-first-deadline-deliver-4-4-k-amid-coronavirus/5176372002/+&cd=1&hl=en&ct=clnk&gl=us.

[111] Torbati Y. Trump is donating ventilators to countries that don't need or can't use them — ProPublica. ProPublica [Internet] 2020. [cited 2020 Aug 12]; Available from: https://www.propublica.org/article/trump-is-donating-ventilators-to-countries-that-dont-need-or-cant-use-them.

[112] Pifer R. Teladoc hikes 2020 guidance after seeing visits double in Q1 | Healthcare Dive [Internet]. HealthcareDive 2020. [cited 2020 Jun 10]. Available from: https://www.healthcaredive.com/news/teladoc-hikes-2020-guidance-after-seeing-visits-double-in-q1/577030/.

[113] Mann DM, Chen J, Chunara R, Testa PA, Nov O, Mann D. COVID-19 transforms health care through telemedicine: evidence from the field. [cited 2020 Jun 10]; Available from:https://academic.oup.com/jamia/advance-article-abstract/doi/10.1093/jamia/ocaa072/5824298.

[114] Bosman J. Domestic Violence Calls Mount as Restrictions Linger: 'No One Can Leave' - The New York Times. New York Times [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.nytimes.com/2020/05/15/us/domestic-violence-coronavirus.html.

[115] Ransing R, Adiukwu F, Pereira-Sanchez V, Ramalho R, Orsolini L, Teixeira ALS, et al. Mental health interventions during the COVID-19 pandemic: a conceptual framework by early career psychiatrists. Asian J Psychiatr 2020;51:102085.

[116] Slat S, Thomas J, Lagisetty P. Coronavirus disease 2019 and opioid use—a pandemic within an epidemic. JAMA Heal Forum 2020;1(5):e200628.

[117] Katz J, Goodnough A, Sanger-Katz M. In shadow of pandemic, U.S. drug overdose deaths resurge to record. The New York Times [Internet] 2020. [cited 2020 Aug 13]; Available from: https://www.nytimes.com/interactive/2020/07/15/upshot/drug-overdose-deaths.html?campaign_id=29&emc=edit_up_20200716&instance_id=20359&nl=the-upshot&regi_id=77480790&segment_id=33562&te=1&user_id=d4701a87f13e78ce24ddf65ccc25eb62.

[118] Kirzinger A, Kearney A, Hamel L, Brodie M. KFF health tracking poll – early April 2020: the impact of coronavirus on life in America | KFF [Internet]. 2020 [cited 2020 Jun 9]. Available from: https://www.kff.org/coronavirus-covid-19/report/kff-health-tracking-poll-early-april-2020/.

[119] Wan W. Coronavirus is causing a historic rise in mental health problems, experts warn - The Washington Post. Washington Post [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.washingtonpost.com/health/2020/05/04/mental-health-coronavirus/.

[120] Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. In: Lancet Psychiatry, Vol. 7; 2020. p. 228–9. Elsevier Ltd.

[121] Golberstein E, Wen H, Miller BF. Coronavirus disease 2019 (COVID-19) and mental health for children and adolescents. JAMA Pediatrics. Am Med Assoc 2020.

[122] Haridasani Gupta A, Stahl A. For abused women, a pandemic lockdown holds dangers of its own. New York Times [Internet] 2020. [cited 2020 Jun 9]; Available from: https://www.nytimes.com/2020/03/24/us/coronavirus-lockdown-domestic-violence.html.

[123] Gross Domestic Product, 1st Quarter 2020 (Advance Estimate) | U.S. Bureau of Economic Analysis (BEA) [Internet]. [cited 2020 Jun 14]. Available from: https://www.bea.gov/news/2020/gross-domestic-product-1st-quarter-2020-advance-estimate.

[124] U.S. International Trade in Goods and Services, March 2020 | U.S. Bureau of Economic Analysis (BEA) [Internet]. [cited 2020 Jun 14]. Available from: https://www.bea.gov/news/2020/us-international-trade-goods-and-services-march-2020.

[125] US Bureau of Labor Statistics Employment Situation Summary [Internet]. US Bureau of Labor Statistics; 2020. [cited 2020 May 26]. Available from: https://www.bls.gov/news.release/empsit.nr0.htm.

[126] Pew Research Center. About three-in-ten Americans have lost a job or taken a pay cut due to COVID-19 [Internet]. 2020 [cited 2020 May 28]. Available from: https://www.pewresearch.org/fact-tank/2020/05/15/majority-of-americans-who-lost-a-job-or-wages-due-to-covid-19-concerned-states-will-reopen-too-quickly/ft_2020-05-15_jobloss_02/.

[127] US Bureau of Labor Statistics. Employment situation summary [Internet]. 2020 [cited 2020 Jun 10]. Available from: https://www.bls.gov/news.release/empsit.nr0.htm.

[128] PBS NewsHourThe May jobs report 'misclassification error' explained | PBS NewsHour Weekend [Internet]. PBS 2020. [cited 2020 Jun 10]. Available from: https://www.pbs.org/newshour/show/the-may-jobs-report-misclassification-error-explained.

[129] OECD. Consumer confidence index (CCI) [Internet]. 2020 [cited 2020 Aug 17]. Available from: https://data.oecd.org/leadind/consumer-confidence-index-cci.htm.

[130] US Bureau of Labor Statistics. Food at home prices up, gasoline and airfare prices down, over the year ended April 2020 [Internet]. 2020 [cited 2020 May 26]. Available from: https://www.bls.gov/opub/ted/2020/food-at-home-prices-up-gasoline-and-airfare-prices-down-over-the-year-ended-april-2020.htm.

[131] Trading Economics. United States inflation rate [Internet]. 2020 [cited 2020 May 29]. Available from: https://tradingeconomics.com/united-states/inflation-cpi.
[132] Daily Treasury yield curve rates [Internet]. [cited 2020 Jun 14]. Available from: https://www.treasury.gov/resource-center/data-chart-center/interest-rates/pages/TextView.aspx?data=yieldYear&year=2020.
[133] Bloomberg L.P. S&P 500 index [Internet]. 2020 [cited 2020 Jun 10]. Available from: https://www.bloomberg.com/quote/SPX:IND.
[134] OECD. Beyond containment: health systems responses to COVID 19 in the OECD - OECD [Internet]. 2020 [cited 2020 Jun 9]. Available from: https://read.oecd-ilibrary.org/view/?ref=119_119689-ud5comtf84&title=Beyond_Containment:Health_systems_responses_to_COVID-19_in_the_OECD.
[135] Galea S, Abdalla SM. COVID-19 pandemic, unemployment, and civil unrest. JAMA [Internet] 2020. [cited 2020 Jun 14]; Available from: https://jamanetwork.com/journals/jama/fullarticle/2767354.
[136] Greiner A, Laviana A, Stewart A, Sapru A, Cartus A, Lee A, et al. Open letter advocating for anti-racist public health response [Internet]. Google Drive 2020. [cited 2020 Jun 10]. Available from: https://drive.google.com/file/d/1Jyfn4Wd2i6bRi12ePghMHtX3ys1b7K1A/view.
[137] Dave DM, Friedson AI, Matsuzawa K, Sabia JJ, Safford S. Black lives matter protests, social distancing, and COVID-19 [Internet]. 2020 [cited 2020 Aug 12]. (NBER Working Paper Series). Report No.: 27408. Available from: https://www.nber.org/papers/w27408.pdf.
[138] Lopez G. Did black lives matter protests cause a coronavirus surge? Vox [Internet] 2020. [cited 2020 Aug 12]; Available from: https://www.vox.com/2020/6/26/21300636/coronavirus-pandemic-black-lives-matter-protests.
[139] The COVID Tracking ProjectAssessment of New CDC COVID-19 data reporting. COVID Tracking Project 2020. [cited 2020 Jun 9]. Available from: https://covidtracking.com/cdc-paper.
[140] Basu A. Estimating the infection fatality rate among symptomatic COVID-19 cases in The United States. Health Aff (Millwood) 2020.
[141] Clemens J, Gottlieb JD. In the shadow of a giant medicare's influence on private physician payments. J Polit Econ 2017;125(1):1–39.