Journal of Economic Perspectives—Volume 37, Number 4—Fall 2023—Pages 3–22

Why Did the Best Prepared Country in the World Fare So Poorly during COVID?

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Though the timing and details of the COVID-19 pandemic caught governments around the world by surprise, the possibility of a new pathogen emerging to cause a deadly pandemic had been long understood by experts in public health preparedness. Even in the months prior to the outbreak of the coronavirus in February 2020, several expert groups warned governments about the potential imminent threat of pandemics and urged them to bolster their preparedness for such events. The Global Preparedness Monitoring Board (2019), a high level independent group of national and global health leaders, published a report called *World at Risk*, in which it concluded that it was "well past time to act" to reduce global vulnerabilities to pandemics and other health emergencies (Global Preparedness Monitoring Board 2019). The Global Health Security (GHS) Index—a framework that measures the readiness of 195 countries for pandemics and other significant biological threat emergencies—determined that "no country was fully prepared" for a potential pandemic (Cameron, Nuzzo, and Bell 2019). Months later, these conclusions became self-evident with the emergence and rapid spread of the SARS-CoV-2 virus that caused the COVID-19 pandemic.

But while the lack of national readiness for a pandemic was anticipated, it was hard to anticipate the extent to which the earlier measures of pandemic preparation seemed to have little connection to the later outcomes. For example, the Global

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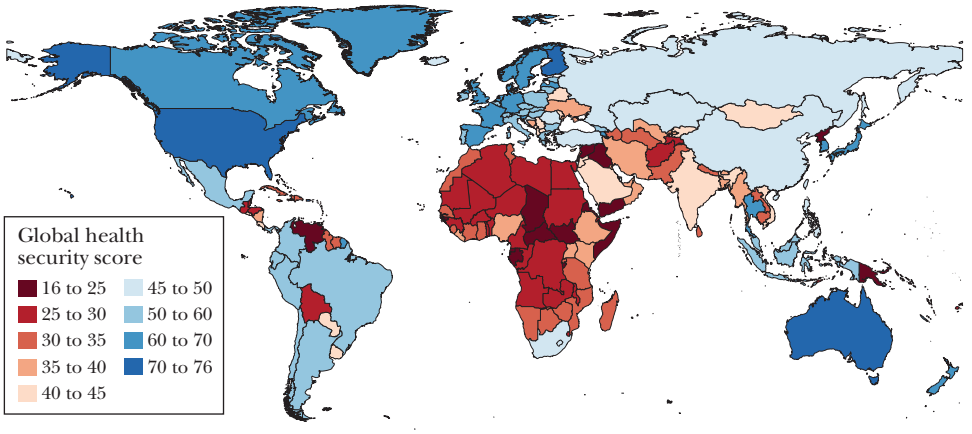
For supplementary materials such as appendices, datasets, and author disclosure statements, see the article page at https://doi.org/10.1257/jep.37.4.3.

Figure 1
Global Distribution of Global Health Security (GHS) Index Scores in 2021



Source: Data are from the 2021 Global Health Security (GHS) Index report.
Note: The Global Health Security (GHS) Index is a comprehensive assessment and benchmarking of 195 countries' readiness for pandemics and other significant biological threat emergencies. The index ranges from 0 to 100 with lower scores indicating weaker health system capacities and higher scores suggesting stronger health system capacities for pandemic readiness. In 2021, the United States had the highest GHS Index score at 75.9.

Health Security Index ranked the United States as the best-prepared country in the world overall, as illustrated by the map in Figure 1. This assessment was based on a variety of measurements grouped in six broad categories: (1) prevention of the emergence or release of pathogens; (2) early detection and reporting for epidemics of potential international concern; (3) rapid response to and mitigation of the spread of an epidemic; (4) sufficient and robust health sector to treat the sick and protect health workers; (5) commitments to improving national capacity, financing, and adherence to international norms; and (6) overall risk environment and country vulnerability to biological threats. But when the pandemic hit, the United States struggled to respond despite its prepandemic advantages (Nuzzo, Bell, and Cameron 2020).

In total, COVID-19 has caused upwards of 6.5 million reported US deaths as of May 2023. The United States, which makes up less than 5 percent of the world's population, accounts for more than 15 percent of the officially reported COVID deaths.

However, the United States has so far failed to undertake a rigorous and comprehensive audit of its pandemic mistakes and challenges. Various academic analyses have attempted to dissect the US COVID-19 experience. Most of these analyses compare disease outcomes in US states or counties with differing COVID-19 policies. Such ecological analyses can help us generate hypotheses as to which actions may explain why disease rates may have differed throughout the country, or across countries, but they do not offer evidence of causality. Instead, causality is obscured by the fact that many communities implemented multiple policies and actions. Moreover,

communities that implemented more aggressive public health interventions likely differed in a number of ways from those communities that chose not to. Unfortunately, much of the existing literature fails to tease apart these important differences.

Collectively, the existing literature suggests that the United States mounted a response that failed to make full use of the preparedness capacities it had, was hampered by politics, made poor use of data, and neglected to overcome intrinsic social vulnerabilities that helped the virus spread and caused high mortality. Below summarizes what we think we know about the US experience during COVID-19 and where the data point toward identifying the source of the country's profound challenges.

The Tolls of COVID-19 in the United States

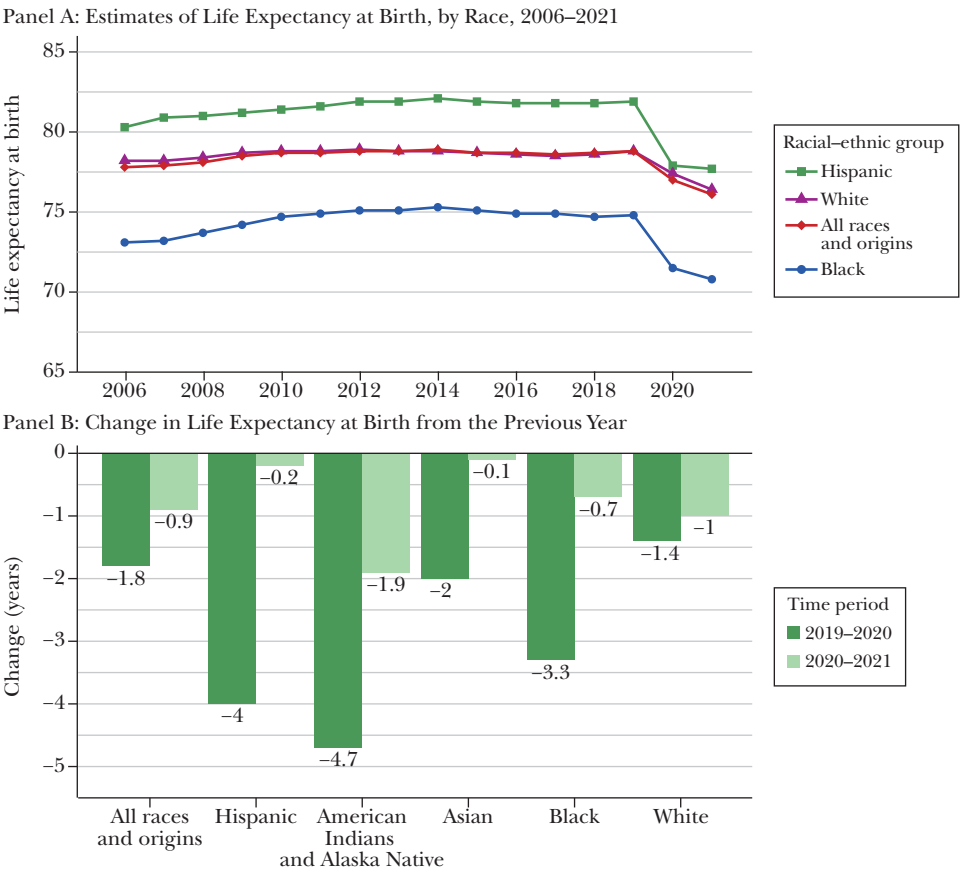
The US health tolls of the pandemic have been staggering. Some skeptics have tried to put the pandemic in context by comparing it to other routine infectious diseases, such as influenza. But the SARS-CoV-2 virus that causes COVID-19 has differentiated itself in terms of the numbers of infections and deaths it has caused. The Centers for Disease Control and Prevention (2022) estimates that between 2010–2020, seasonal influenza killed between 12,000 and 52,000 Americans per year. From the start of the pandemic in February 2020 through the end of 2022, COVID-19 killed more than 1.1 million Americans.

This cumulative mortality of the SARS-CoV-2 virus has been large enough that in 2020 and 2021, US life expectancy dropped for two consecutive years, reaching a low not seen since the mid-1990s (Arias et al. 2022). Indeed, the two-year decline was the biggest the United States had seen since 1921–1923. Most of these declines in life expectancy that occurred in the first two years of the pandemic were directly caused by the pandemic, as a result of increased deaths due to COVID-19. The Centers for Disease Control estimates that COVID-19 deaths contributed to 74 percent and 50 percent of the decline in life expectancy in 2020 and 2021, respectively (Arias et al. 2022).

Pandemic mortality has not been experienced equally across the United States. Throughout the pandemic, there were stark racial/ethnic disparities in the case, hospitalization, and death data, which translated to disproportionate declines in life expectancy. Overall, life expectancy decreases during 2020 and 2021 were largest among non-Hispanic Native Americans, followed by Hispanic-origin and Black people, as shown in Figure 2 (Arias et al. 2022). In the second year of the pandemic, however, these trends shifted. All racial and ethnic groups experienced declining life expectancy in 2020 and 2021, and also experienced the biggest decreases in life expectancy in the first year of the pandemic. However, the improvements in declining life expectancy were smallest for whites, compared to other groups, after safe and effective COVID-19 vaccines became available.

Again, COVID-19 was the leading contributor to declines in life expectancy in all racial/ethnic groups and among men and women during the pandemic. But

Figure 2
Temporal Trends in Life Expectancy at Birth by Racial/Ethnic Groups in the United States, 2006–2021



Source: Data from the National Center for Health Statistics, United States Centers for Disease Control and Prevention.
Note: Panel A visualizes annual life expectancy at birth estimates by race from 2006 to 2021. Data for American Indians and Alaska Natives (AIAN) and Asian not available from 2006 to 2018. Panel B illustrates the change in life expectancy at birth by comparing the year of interest to the year prior. All Hispanics are included in the "Hispanic" category, so other groups should be interpreted as "Non-Hispanic Whites," "Non-Hispanic Blacks," and so on.

aside from its direct harms, the pandemic may have contributed to a decline in life expectancy due to other causes.

For example, in the first two years of the pandemic, the second-leading contributor to declining life expectancy were nonintentional injuries, a category that includes overdose deaths. During this period, drug-involved overdose deaths rose sharply (National Institute on Drug Abuse 2023). An increase in substance use and disruptions in mental health and substance-use treatment during the pandemic

may be reasons for the observed increase in overdose deaths. Substance use appears to have increased during the pandemic, particularly during the first year (Panchal et al. 2023). Similarly, health claims data showed a decrease in utilization of behavioral health treatment services, possibly due to health service disruptions caused by the pandemic (Mellis, Potenza, and Hulsey 2021), but a majority of a local health departments reported in a national survey that they reduced the level of substance-use related services offered during the pandemic (Hall et al. 2022).

Another health risk is the "post-acute sequelae of COVID," or "long COVID," the name given to the occurrence of persistent symptoms among patients who have recovered from COVID-19 (as reported by Nabavi 2020). In some cases, these symptoms are debilitating and interfere with patients' ability to work and quality of life. Estimates of the prevalence of long COVID vary widely—from 7.5 percent to more than 40 percent (Ford et al. 2023). Such wide estimates speak to the need for more rigorous and standardized methodologies for studying the condition. Regardless, the evidence available suggests the total number of patients affected could reach into the millions. Rigorous studies and better clinical case definitions are needed to enumerate more precisely the effects of long COVID and to identify treatments (Munblit et al. 2022). More research is also needed to understand the prevalence of prolonged symptoms following other acute infections, which there is some early evidence may affect patients (Choutka et al. 2022)

No Country Escaped COVID, but the United States was Exceptional

In comparison with other countries, the United States reported the greatest number of COVID-19 deaths throughout the majority of the pandemic and continues to do so today. Due to differences in countries' surveillance approaches, age structures, and underlying comorbidities, understanding why the US death tolls during the pandemic were comparatively higher than other countries requires more careful analysis than simply comparing reported case and death numbers.

One misperception that arose during the pandemic was that the best-prepared countries as a group were hit hardest by the virus. This assertion was largely based on a comparison of countries' official COVID-19 surveillance data case and death numbers, which appeared to indicate that countries that scored higher in preparedness frameworks like the Global Health Security Index and the Joint External Evaluation, a monitoring and evaluation tool used by the World Health Organization, reported the highest number of COVID-19 cases and deaths (Haider et al. 2020; Aitken et al. 2020; Kim et al. 2021). These analyses and others have led some to conclude that pandemic preparedness efforts were ineffective at mitigating the health consequences from the COVID-19 pandemic (Omberg and Tabarrok 2022).

We now have evidence that the perceived inverse relationship between countries' pandemic preparedness and COVID-19 tolls was largely driven by inadequacies in global surveillance. In the early days of the pandemic, it was difficult to get an aggregate picture of which countries were being affected by COVID-19 and to what

extent. The World Health Organization initially published official country case reports in PDF files that provided limited information regarding the relative spread of the virus. Eventually, the Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE) COVID-19 Dashboard launched to aggregate case data, including from unofficial sources, that were reporting in real time to generate a timelier tally and map of cases (Dong, Du, and Gardner 2020; Dong et al. 2022). Other groups, like private companies and journalistic outlets, followed, creating more options for viewing timely aggregated pandemic data. As governments and organizations like the World Health Organization improved their own data-tracking options, the quality of national case data generally improved.

However, tracking cases and deaths from the COVID pandemic across countries has remained challenging. Initially, countries differed in how quickly they were able to establish testing for COVID-19. While all countries eventually gained the ability to test for the presence of the SARS-CoV-2 virus, they differed in how much testing actually happened. For example, by July 2020, it was estimated that most countries in Asia and Africa had tested less than 1 percent of their populations for COVID-19, as compared with 10–20 percent population testing coverage reported by the United States, Russia, and countries in Europe (Amukele and Barbhuiya 2020). In October 2021, the World Health Organization office for the African region estimated that only one out of every seven SARS-CoV-2 infections in the region were being detected (World Health Organization African Region 2021).

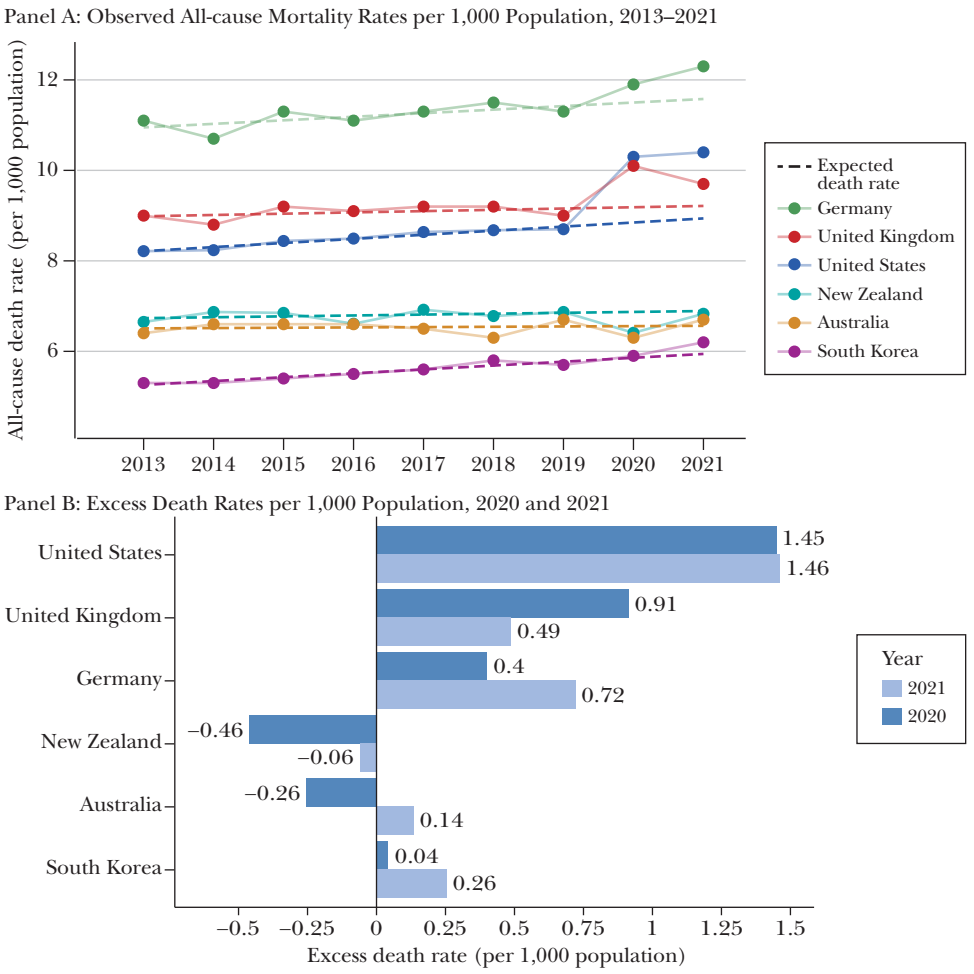
COVID-19 deaths also proved to be hard to track globally for similar reasons. An early indication that some countries were undercounting deaths came from a postmortem analysis conducted in Zambia, which estimated that, because of undertesting, as few as 10 percent of all COVID-19 deaths that occurred in the country may have been identified (Gill et al. 2022). The study also noted that testing in Zambia was rarely performed before death and almost never performed for deaths that occurred outside of healthcare facilities.

The bottom line here is that trying to track COVID-19 cases across countries may only be measuring how much or how well countries are counting. To understand the tolls of the COVID pandemic, we are better off using metrics that are less dependent on tools like the extent of COVID testing.

One measure that has turned out to be particularly useful for tracking the pandemic is "excess deaths," which can quantify the total mortality impact of the pandemic. Rather than relying on diagnostic tests to directly enumerate COVID-19 cases and deaths, we can compare deaths from all causes observed during the pandemic to what we would expect given historical patterns to derive excess mortality. Figure 3 provides an illustration of how excess mortality is computed for select countries. This measure provides a comprehensive understanding of the levels of deaths that occurred throughout the pandemic, as it captures both direct COVID-19 deaths and deaths that are an indirect effect of the pandemic, such as those resulting from health service disruptions (in this journal, see Alsan, Chandra, and Simon 2021 for a more detailed explanation of excess deaths).

Figure 3

All-Cause Mortality Rates per 1,000 Population for Selection Countries, 2013–2021



Source: All-cause death rate data are from the World Bank.

Note: Panel A demonstrates observed all-cause mortality rates per 1,000 population for six countries from 2013 to 2021. The points are observed all-cause death rates, while the dashed line is the expected death rate under normal conditions. Panel B showcases the corresponding country-specific excess death rates per 1,000 population, which were computed by subtracting the observed death rate from the expected death rate in the years 2020 and 2021. Expected death rates computed by running country-specific linear regressions where observed deaths points from 2013 to 2019 were used as input.

Measures of excess deaths suggest that many countries with lower reported COVID-19 cases may have suffered more greatly than their official statistics indicated. The relationship is even more pronounced when we account for differences in countries' demographics—a necessary step, given that age is the single biggest risk factor for dying from COVID-19.

Figure 4 provides a detailed illustration of how the relationship between the Global Health Security Index and mortality changes as we take into account the above biases in reported COVID-19 data. Panel A confirms previous studies that have demonstrated that the most prepared countries report the largest crude rates of COVID-19 deaths. However, by utilizing excess mortality as the outcome, and thus sidestepping the problems of how well COVID deaths were counted, we see a flat line (a null relationship) in Panel B.

When we further adjust for age—the single largest risk factor of COVID-19 mortality—through indirect age-standardization methods (Heuveline and Tzen 2021), we now see the expected negative relationship where the most prepared countries experienced the lowest mortality rates. The age-standardization process is a critical step before making direct country-level comparisons, because countries with a larger share of elderly individuals are expected to have higher rates of COVID-19 deaths, with the latest data confirming that over 80 percent of all global COVID-19 deaths occurred in people aged 60 years and greater (Harris 2023). Other work that has argued for no relationship between the Global Health Security Index and excess deaths does not include age-standardization, and thus lacks this crucial step for comparing health effects of the pandemic across countries.

Our own work has further confirmed the negative relationship shown in Figure 4 and the benefits of pandemic preparedness even after accounting for cross-country differences in income (Ledesma et al. 2023). That is, when we compare national Global Health Security Index scores to age-standardized excess deaths, we see across all income groups evidence that those with higher scores tended to experience lower excess mortality during the pandemic than those with lower scores. Not only do we see a difference in excess mortality between higher- and lower-prepared countries, but we also see an inverse linear relationship between age-standardized excess mortality and preparedness.

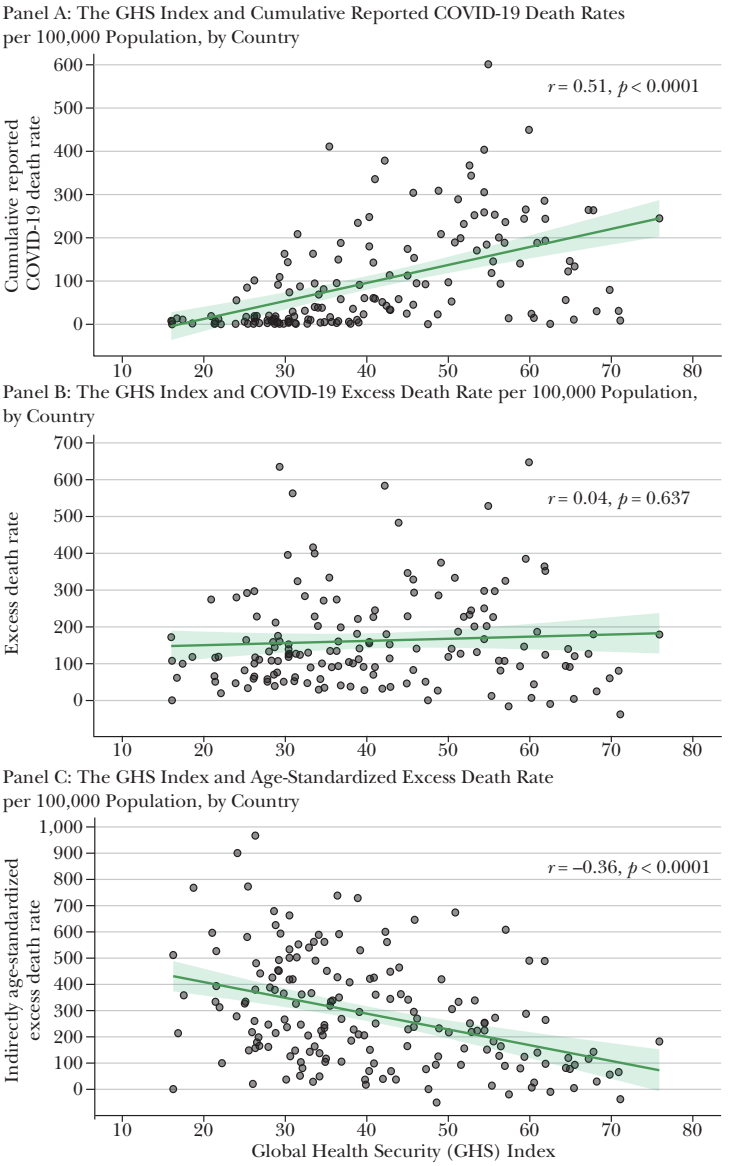
Though these findings contradict the earlier analyses that showed the better prepared countries tended to report the most COVID-19 deaths, an inverse relationship between preparedness measures and pandemic-related mortality should not be surprising. Preparedness frameworks like the Global Health Security Index count the capacities that countries use to enumerate and report infections and deaths. It is not unreasonable to think that those countries with more capacities can more easily find and report deaths.

But when we account for biases due to differences in countries' age structures and surveillance capacities, the United States stands out as a clear outlier, as shown in Figure 5. Although the United States was among the highest prepared countries as measured by the Global Health Security Index, it experienced the third-highest age-adjusted mortality. The observed excess mortality in the United States is almost more than eight times higher than what we would have expect given the observed mortality in the other highest prepared countries.

To understand how well countries will do in a pandemic, it is important to understand not only what resources they have to respond to a pandemic, but also

Figure 4

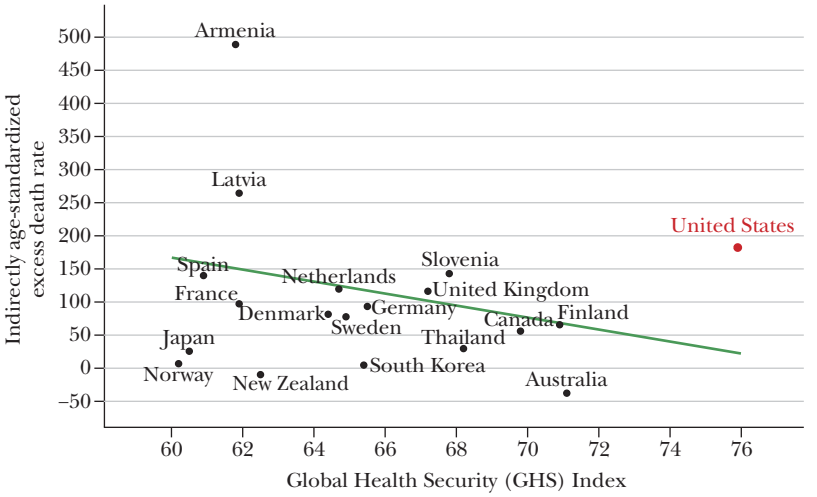
Relationships between the Global Health Security (GHS) Index and COVID-19 Mortality Rate Outcomes per 100,000 Population, 2020–2021



Source: Panel A shows the relationship between the Global Health Security (GHS) Index and cumulative reported COVID-19 death rates per 100,000 population. COVID-19 death data from the John Hopkins COVID-19 data repository, while population counts are from the United Nations (UN) Population Division in 2021. Panel B demonstrates the relationship between the GHS Index and COVID-19 excess mortality per 100,000 population. The excess death data are from the Institute for Health Metrics (IHME) COVID-19 database. Panel C visualizes the relationship between the Global Health Security (GHS) Index and indirectly age-standardized excess death rate per 100,000 population. Excess death rates are from IHME COVID-19 database.

Note: The black points represent countries, while the green line represents linear regression lines with the shaded area visualizing the corresponding 95 percent confidence intervals. Pearson *r* correlations with *p*-values shown in each panel. Some countries removed from panels for clarity. All COVID-19 mortality data are cumulative from January 1, 2020, to December 31, 2021.

Figure 5
Relationship between the Global Health Security (GHS) Index and Indirectly Age-Standardized Excess Death Rate per 100,000 Population for the Most Prepared Countries, 2020–2021



Source: Excess death rate data are from the IHME COVID-19 database.
Note: This figure is analogous to panel C of Figure 4 but limited to countries with Global Health Security (GHS) Index scores of at least 60. The dark green line is the linear regression line from Figure 4 panel C. Considering the association between the GHS Index and age-standardized excess death rate, the age-standardized excess death rate for the United States was expected to be 23 per 100,000 population but the observed rate was 182 per 100,000 population.

how well they use them—or even *whether* they use them. In the case of the United States, specific gaps in its pandemic preparedness may have proven to be especially harmful during COVID, and there was also a failure to use is resources appropriately in responding to the pandemic.

Gaps and Challenges for US Preparedness

Though the United States outranked 194 other countries in the 2019 Global Health Security Index that sought to measure pandemic preparedness, the same report also noted that every country, including the United States, lacked some necessary capacities or possessed risks that could hinder its response to a pandemic. In some cases, existing risks or missing capacities in one area could hinder use of other capacities. For example, a country that has advanced laboratory capacities may not be able to fully realize the benefits of this resource if it lacks a plan to communicate who is at risk of infection and would benefit from being tested.

In 2019, the United States lost points in the Global Health Security Index in a number of areas that may have been especially relevant to its response to COVID-19. One deficiency is that while the US healthcare system has very high spending substantially due to expensive technologies, it does not rank very highly on some basic quantities. Among 60 high-income countries in the GHS Index, the US ranked 38th for its number of physicians per capita and 40th for its number of hospital beds per capita, according to World Bank and World Health organization data. The United States also ranked 175th in the globe for access to healthcare, due to its lack of universal health coverage and high out-of-pocket healthcare costs. Throughout the pandemic, US health facilities struggled to meet demands for care. This pattern likely exacerbated both the direct harms of COVID-19 and the indirect healthcare impacts from the pandemic.

Out-of-pocket costs, and fears of such costs, did affect the pandemic response. Though legislation passed in 2020 sought to remove cost barriers for SARS-CoV-2 testing, testing costs remained and have been cited as a barrier to testing performed in the United States (Kurani et al. 2021). Similarly, while COVID-19 vaccines were provided by the US government free of charge, misperceptions regarding the vaccines' cost were often cited as a reason people delayed getting vaccinated (Hamel et al. 2021).

In addition, some of the United States' existing preparedness capacities may not have been as functional as previously thought. Although the United States had established a national stockpile of medicines, personal protective equipment, and ventilators, when signs of a new outbreak surfaced, calls by federal officials to replenish and augment these supplies were ignored (as reported in Taddonio 2020).

For a federalist country like the United States, it is also important to look beyond the US government's readiness for a pandemic. Whatever efforts the US government makes to amass and exercise plans, resources, tools, and policies, the effects may ultimately be determined by efforts within individual communities. Across the United States, there are more than 3,000 local health departments in 53 states and territories that have a role in responding to crises. In many areas, these local entities have the primary response authority. However, following the recession of 2008–2009, many states reduced public health spending, which translated to cuts of more than 55,000 jobs in local health departments (National Association of County and City Health Officials 2018). Staff shortages left many local health departments unable to adequately conduct case investigations and contact tracing during the early COVID-19 response. To address these shortcomings, part of the American Rescue Plan Act of 2021 was focused on funding COVID-19 testing, contact tracing, and mitigation (Nuzzo and Gostin 2022).

Some factors intrinsic to the United States, and not measured by the Global Health Security Index, likely made it more vulnerable than other countries to the specific epidemiology of the SARS-CoV-2 virus. For example, compared to other countries, the United States has a high percentage of its population living in congregate settings that enable the virus to spread among populations that are particularly susceptible to severe illness from it.

As one prominent example, nursing homes are a congregate setting that may have contributed to high levels of mortality in the United States. Compared to some other high-income countries, the United States had a higher percentage of its 65-and-older population living in nursing homes (Ribbe et al. 1997). For much of the first year of the pandemic, nursing homes accounted for a large share of the total COVID-19 deaths reported in the United States (Shen 2022). Shen (2022) finds that staff neighborhood characteristics were a large and significant predictor of COVID-19 nursing home deaths. Specifically, the author found that nursing homes whose staff came from denser, less white neighborhoods with more public transportation use had significantly larger outbreaks of COVID-19. Another study published in August 2021 calculated that the COVID-19 death rate for seniors living in nursing homes was 23 times that of those who lived outside of these facilities, in part because of lower quality of care and lapses in infection-prevention protocols in nursing homes (Cronin and Evans 2022).

As another example, the United States has one of the highest proportions of its population in prison or jail. Several studies have identified an association between prisons and higher community burden of COVID-19 and COVID-19 mortality (LeMasters et al. 2022; Lofgren et al. 2022; Saloner et al. 2020).

The Potential Disconnect between Preparedness and Response

Preparing for pandemics is a subset of efforts within the larger field of health emergency preparedness, which the World Health Organization (2017) has defined as "the knowledge and capacities and organizational systems developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from the impacts of likely, imminent, emerging, or current emergencies." This resource-focused definition of preparedness highlights the difficulty in making direct linkages between countries' preparedness for health emergencies and the actual experience of countries during a pandemic. Preparedness, encompassing the tools that are amassed and the actions taken prior to an emergency, represents only the first half of the equation. The second part entails response—what countries actually do during a health emergency.

In this way, preparedness capacities can be thought of like fire prevention and safety tools. Smoke detectors and fire alarms are important for providing early warning when a fire occurs. Testing whether such capacities will function as planned, such as by checking that fire alarms work and exercising building evacuation plans, also are key to preparing for fires. Policies that reduce risks from fires, such as building codes, help illuminate and reduce the baseline risk for fires. But while these fire safety tools can aid in reducing the frequency and harms from fires, their mere existence is never entirely predictive of how the actual response that will happen when a fire occurs. As with pandemic preparedness, how governments, organizations, and individuals will use their capacities and overcome risk factors will ultimately determine the number of lives that will be saved or lost.

Here, we will sidestep some of the controversial questions about the response to the COVID-19 pandemic, like the effectiveness of mask mandates and school closures. These topics offer important research questions. But at the national level, it is difficult to attribute differences in national mortality to specific policy approaches. Most of the studies rely on observational data, but differential biases in how nations mixed these policies together and how they generated their data relevant to COVID-19 limit what these analyses can tell us. Within the United States, response to COVID-19 was largely implemented at the state and local level and was variable throughout the pandemic. The simultaneous application of multiple policies and other response measures in communities, along with the presence of unmeasured differences between those communities that chose to implement certain measures and those that did not, makes drawing causal inferences difficult. Finally, it would be unwise to extrapolate directly from whether these steps were useful during the COVID pandemic to whether they might be useful in a future pandemic with different epidemiological characteristics.

Despite the limitations of existing evidence for drawing causal inferences, certain factors associated with the US response warrant further investigation as possible causes for its poor outcomes relative to other countries.

First, the United States did not fully make use of its preparedness capacities in its response to the COVID-19 pandemic. A key initial lapse was its failure to quickly make use of its massive network of high-quality laboratories to diagnose and characterize infections. Although the United States has a world-class network of public health and clinical laboratories, which had the capacity to develop their own assays to test for SARS-CoV-2, federal restrictions initially prevented these laboratories from doing so. News outlets have documented strategic and operational missteps the United States made in rolling out test kits to US laboratories, shoring up testing supplies, and harnessing domestic research and development capacity to create rapid tests that could be used outside of the laboratory (Shear et al. 2020). This severely constrained the number of tests the United States could conduct (and likely allowed the virus to spread around the country undetected) until these restrictions were eventually lifted.

Being slow to establish testing relative to other high-preparedness countries, like South Korea, allowed the virus to spread silently in communities, making it difficult to slow or contain the spread (Nuzzo and Gostin 2022). Decreasing the time to identify and isolate infected individuals significantly reduces transmission of the virus (Wang et al. 2022). However, even after testing was established throughout the United States, delays in getting those test results to patients persisted throughout much of the pandemic. Even now, the lack of a national testing strategy and unaddressed shortages in testing supplies continue to limit the country's ability to suppress SARS-CoV-2 (Neelon et al. 2021; Hsiehchen, Espinoza, and Slovic 2020; Shvetsova et al. 2022; Grossman et al. 2020) .

Second, politics seemed to play an important role in the pattern of COVID-19 mortality. Though public support for the health agencies' handling of the pandemic was initially high among members of both political parties, overall support eroded over time, with greater declines seen among Republicans (Kirzinger

et al. 2023). This partisan erosion of support for health agencies' response tracked with partisan lack of compliance with public health recommendations aimed at slowing the spread of the virus.

An association developed between politics and poor health outcomes. One study found that by the end of July 2022, states with a greater fraction of their populations that voted for the 2020 Republican presidential candidate had reported higher COVID-19 cases and deaths (Bollyky et al. 2023)—but not all states struggled equally. This finding builds on evidence from studies that showed partisan differences in testing rates, COVID-19 deaths, and adherence to public health disease control recommendations (Neelon et al. 2021; Hsiehchen, Espinoza, and Slovic 2020; Shvetsova et al. 2022; Grossman et al. 2020). Political affiliation was also identified as a key factor associated with differences in vaccine uptake. About four months after COVID-19 vaccines first became available, the uptake among US counties that voted for Donald Trump and those that voted for Joseph Biden began to diverge. By January 2022, COVID-19 vaccination coverage in counties that voted for Trump was an average of 13 percent lower than in counties that voted for Biden (Kates, Tolbert, and Rouw 2022).

Understanding the interactions of which came first—loss of public support for the COVID-19 response or loss of some political leaders' interest in responding to COVID-19—is important to know. If it is the former, developing and socializing better pandemic response playbooks could be necessary. If it is the latter, better equipping politicians and public health officials to lead during health emergencies may be helpful.

The challenge of minimizing politicization may be especially difficult in the United States. In the Global Health Security Index of pandemic preparedness, the United States was one of only a small number of high-income countries that received the lowest possible score for its level of public confidence in government. Poor confidence in the government can undermine the public's adherence to officially sanctioned or directed disease-control measures. Ultimately, public confidence in government was one measure in the GHS Index that was found to be significantly associated with countries' observed excess mortality (Ledesma et al. 2023).

Mixed communication messages from public health leaders during the pandemic may have also led to politicization and erosion of support. At the start of the pandemic, US officials committed several communication errors. Some pertained to changing scientific evidence. For example, health officials initially discouraged the use of masks, but later mandated them when evidence emerged that the SARS-CoV-2 virus that causes COVID-19 could be transmitted by people without symptoms. Changing science, however, was not the only source of communication error. There were larger challenges in setting expectations for how the pandemic would unfold. Initially health officials discussed the need to shut down public gatherings, schools, and businesses and otherwise implement social distance policies in limited terms—for example, the Trump administration's COVID guidelines spoke of staying home for 15 days to slow the spread (Feuer and Higgins-Dunn 2021). But while knowledge of the virus has changed over the course of the pandemic, there was almost no evidence at the time that

suggested the pandemic was capable of ending within two weeks. Failing to set up the American public adequately for what was in store likely is part of why support for health officials' advice, which was initially high at the pandemic's start, eroded over time (Kirzinger et al. 2023).

The director of the Centers for Disease Control (CDC) recently acknowledged that the agency failed in its response to COVID-19, owing to delayed case reporting and inconsistent communication of social distancing, masking, and vaccination (Tanne 2022). While politicization of the pandemic likely harmed compliance with COVID-19 mitigation strategies, the inconsistent messaging from public health leaders may have also played a role. Improved communication messaging is therefore critical for future public health emergencies. Data from qualitative studies indicate that having messaging that is tailored, culturally congruent, and delivered by trusted messengers while countering misinformation in real-time is most effective (Overton et al. 2021). The need for clear, science-based communication was affirmed by a nationally representative poll of the American public, which found that higher trust in the CDC was tied to a belief that the agency provided evidence-based and protective resources, rather than a belief that the agency did a good job at controlling the outbreak (SteelFisher et al. 2023). Though the CDC's new emphasis on communication, timeliness, collaboration, and accountability will help overcome the limitations of its previous inconsistent messaging and improve health communication strategies, more direct investigations are needed on how the CDC's messaging may have impacted compliance with response strategies.

A third factor that warrants investigation is that the United States struggled to aggregate, analyze, and publish real-time COVID-19 data to help state and local governments, businesses, schools, community groups, and individuals make decisions about how best to protect themselves. Initially, the most complete and up-to-date data were assembled and published by nongovernmental organizations. When Lauren Gardner and Ensheng "Frank" Dong and at Johns Hopkins created the "Hopkins COVID map," it was one of the first sites to publish a map and near-real-time tally of global COVID-19 cases (Dong, Du, and Gardner 2020). Soon after, a volunteer team organized by *The Atlantic* magazine set up a pivotal COVID-19 testing tracking site. The fact that this nongovernmental source of data became the go-to resource for governments, private-sector and other nongovernmental organizations, media, and members of the public is somewhat of an indictment of US governmental surveillance efforts (Donovan 2023; Benadjaoud and Egan 2023).

While nongovernmental efforts could aggregate and display data that state and local government response agencies made public, these data were often of variable quality and not standardized between states. As a result, these data-trackers were only a partial substitute for what should have been a government-led effort to generate high-quality, standardized surveillance data. In the United Kingdom, well-designed surveys were launched to understand the incidence of COVID-19 and demographics of the patients who were being infected—which could then help

government to address difference in who has access to or inclination to get tested or vaccinated. Though many experts called on the US government to develop such surveillance surveys to supplement its incomplete and biased passive surveillance efforts, it did not do so (Dean 2022).

The lack of adequate data likely undermined the ability of the United States to mount responses to the pandemic that were tailored to local circumstances. Efforts to decide which measures were best suited to control the spread of the virus were undermined by lack of data. For example, while debates were raging about whether school closures were affecting disease transmission rates, the US government did not have a national database on school closures (Goldstein 2021). Faced with rapidly rising cases, state and local health departments implemented broad measures, such as state- or county-wide mask mandates or rules on social distancing without knowing whether transmission was being driven by exposures in the environments likely to be affected by the mandates (Nuzzo and Blauer 2021).

Fourth, the United States was late to increase genetic testing needed to track variants of COVID, which likely hindered its response to deadlier and more transmissible variants of the virus (Asgari 2021). When the "delta variant" became of concern in the United States in mid-2021, the United States had only sequenced about 4 percent of cases it had detected by that date (Schuster-Bruce 2021)—far behind the sequencing efforts of the United Kingdom and other high-income countries. Not knowing how widespread the delta variant was made it difficult to mitigate the increase in hospitalizations and deaths that the virus caused.

Finally, the United States did not respond to the pandemic in ways that would counterbalance underlying social vulnerabilities that were likely to increase its COVID-19 tolls. Throughout the pandemic, disparities in stark racial/ethnic composition of reported COVID-19 cases, hospitalizations, and deaths pointed to a need to increase efforts to protect those at greatest risk. For example, an analysis of state-reported testing data showed that while Hispanic/Latino people were more likely to be hospitalized and die from the virus than non-Hispanic/Latino people, there were fewer tests performed for every case identified among Hispanic/Latino people as compared with other racial/ethnic groups (Pond et al. 2022). Insufficient efforts to address income inequality may have been another challenge to the US response. There is evidence that US counties with greater income inequality experienced higher levels of cases and deaths. Furthermore, people with lower incomes were more likely to report life circumstances that impede their ability to reduce their risk of infection, including inability to telework (Papageorge et al. 2021).

The Need for a Consensus on Lessons for Future Health Emergencies

Analyses of why the United States experienced such high levels of COVID-19 mortality relative to its level of preparedness point to several possible reasons. First, while preparedness may be necessary to mount an effective response to a pandemic, the United States may have underutilized its existing pandemic-related

tools, capacities, and policies. Second, while all countries possess intrinsic factors that may make them more vulnerable to pandemics, the United States may have failed to account for these vulnerabilities in how it applied its capacities to respond to COVID-19. Third, the US response to the pandemic was challenged by politics, inconsistent messaging, inadequate data, and inequality.

However, these conclusions are only suggestive. The academic literature and public media accounting of the US experience do not tell us about the decision-making, resource constraints, and operational tradeoffs that government leaders experienced. Without a full audit of the inner workings of the US governmental response, we are left with holes in understanding how one of the best-prepared countries in the world suffered worse from the pandemic than its peers.

Ideally, the US government would pass legislation to create a serious bipartisan audit of its COVID experience—one that opens the books on efforts of the Biden, Trump, and earlier administrations to prepare for and respond to pandemic threats. Much like the passage of a law requiring an inquiry into US missteps leading up to 9/11 (Commission on Terrorist Attacks upon the United States 2004), a thorough record and investigation of governmental efforts to prepare for pandemic threats are needed to understand what the United States did and did not do, and why the country failed to make better use of its prepandemic advantages.

The COVID pandemic has been referred to as a once-a-century crisis, referring back to the Great Influenza Pandemic of 1918. But while these two society-changing events bear some similarities, it is not accurate to assume that pandemics will only come every 100 years. Since 1918, a steady stream of infectious disease emergencies has challenged the United States in different ways. Standout examples include: three influenza pandemics (1957, 1968, and 2009), the HIV pandemic, the reemergence and global spread of Zika virus, and the recent MPOX (formerly monkeypox) outbreak. The steady cadence of these emergencies tracks with data that strongly indicate that the frequency with which new pathogens arise and cause outbreaks has steadily increased. Even accounting for improvements in surveillance, the frequency of emerging infectious disease outbreaks tripled between 1980 and 2010 (Smith et al. 2014). Prudence suggests expecting a rising number of infectious health emergencies in the future and preparing accordingly.

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