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**What Can the U.S. learn from its Covid-19
response?**

By Patrice Jude PIERRE †

Abstract. The COVID-19 pandemic gave minimal reaction time to governments around the world. While causing millions of deaths, it was also detrimental to the global economy. This paper is an attempt to understand what we can learn from our experience with the virus, with a focus on the United States. I discuss good and bad U.S. policies and the overall performance of institutions involved in pandemic response. The approach is economical because it connects what happened with some key economic principles. I talk about how markets helped us generate most of the knowledge we have on the virus, and I explain how existing regulations slowed down the production and distribution of essential items in the fight against Covid. Given the scarce nature of public attention, I also discuss the lack of consistent public messaging for the pandemic in the United States.

Keywords. Coronavirus, Covid-19.

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1. Introduction

As of August 10, 2021, the Covid-19 pandemic has caused approximately 4.3 million deaths and about 203 million confirmed cases worldwide ([Coronavirus Resource Center, 2021](#)). In the United States, the virus has killed over 600,000 people. The federal government was slow to respond and the effectiveness of its policies was debatable. It did a poor job gathering information about the virus and disseminating a clear, consistent message to guide public behavior.

I do not want to scapegoat individuals for the Covid-19 response in this essay. Rather, it represents an economist's inquiry. I am not a public health expert, and this is not a direct guide to an effective Covid-19 response. Rather, I incorporate some key economic principles to talk about the United States' response to Covid-19 in the hope that it improves public health responses in future pandemics. The emphasis is on the performance of governments and institutions involved in pandemic response. The principles I emphasize are:

- Knowledge is not always pre-existing, but markets can help generate it;
- Governments can help create knowledge through research funding; but they can also hinder it with inappropriate regulation;

† Department of Economics and Political Science, University of Rhode Island, USA.

☎. +602-505-3855 ✉. patrice_pierre@uri.edu

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- Public attention is a scarce resource; and
- Policy makers and the public should be aware of the costs and benefits of certain decisions, for example the benefits of lives saved through lockdowns versus the cost of rising unemployment and inadequate care for patients with pre-existing conditions.

The Centers for Disease Control (CDC), the main institution responsible for addressing situations like the Covid pandemic in the United States, took a relatively long time to publicize the seriousness of the virus. Despite monitoring travelers from China, the CDC neglected the dimension of the spread of Covid-19, which had already affected China's neighbors. It is important to look at what countries close to the center of the virus have done to detect and prevent the virus. The most instructive case is probably Taiwan, which has registered one of the lowest death rates due to Covid-19.

Since we now have some knowledge about the virus, we have made some progress, but we still have a long way to go. Vaccine efforts started under President Trump and President Biden set vaccination goals that are appropriate. Authorities were so eager to get a vaccine that they funded many firms in hope of finding something fast and effective. This would be a good policy to repeat in case of another pandemic. However, vaccination efforts should not be concentrated in the United States, as the virus is still spreading and becoming more contagious. There is also the problem of vaccine wastage: many countries do not have the appropriate infrastructure to store and distribute the vaccine (Cowen, 2021).

This paper is an attempt to summarize some of what we can learn from the ongoing Covid-19 pandemic as a means to generate new knowledge. The evidence shows that the United States was not prepared and that international cooperation during the crisis was at best weak. Therefore, there needs to be discussion about the costs and benefits of certain policies, both domestic and international. The goal is to use what we currently have to think about a more economical approach to future pandemics.

Throughout the paper I will discuss good and bad U.S policies and the implications for future pandemics. The paper starts with an analysis of the different stages of detection and prevention response, progresses to production and distribution, and examines Covid-19 research and publicity. I will also look at what other countries closer to China, where the virus originated, have done to try to detect and prevent it. The research will try to answer these three questions: 1) How did the U.S react to the Covid-19 pandemic? 2) What did countries with fewer cases per capita did better than the U.S.? 3) What can we learn for the future?

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Table 1. *Key Covid events, with an emphasis on the United States*

2019	
December 31	China reports cluster of cases
2020	
January 9	Official WHO announcement about coronavirus-related disease in China
January 21	First U.S. official case; Chinese scientists confirm human transmission
January 31	WHO issues global health emergency; U.S. travel ban applied to China
February 3	United States declares public health emergency
February 25	CDC announces Covid-19 is approaching pandemic status
March 11	WHO declares Covid-19 a pandemic
March 13	President Trump declares Covid a national emergency; travel ban on non-U.S. citizens traveling from Europe
March 19	California becomes the first state to issue stay-at-home order
March 27	CARES Act (Coronavirus Aid, Relief, and Economic Security Act)
May 21	Vaccine deal between the U.S. government and AstraZeneca
June 10	U.S. reaches 2 million cases
July 7	U.S. surpasses 3 million cases
July 27	Senate introduces HEALS Act (Health, Economic Assistance, Liability Protection and Schools Act)
August 11	U.S. government deal with Moderna: 100 million doses at \$15/dose
September 1	U.S. rejects Covax proposition
September 16	U.S. releases Covid vaccination plan
November 3	Trump loses U.S. presidential election in part on Covid response
November 9	Vaccine companies start to announce successful results
December 15	U.S. begins with vaccinations
2021	
February 1	More Americans vaccinated than infected with Covid-19
March 19	100 million Covid-19 vaccine doses administered in the U.S.
July 8	67% of Americans vaccinated at least once.
July 9	Report of G20 panel, "A Global Deal for Our Pandemic Age"
August 1	70% of U.S adults received at least one dose of COVID-19 vaccine

2. Detection

People can be infected with the Covid-19 virus in various ways. The CDC states that one can catch the virus by inhalation, direct deposition, or touching. Therefore, it is important to detect it before it spreads from one person to another. The biggest pandemic before Covid, the H1N1 swine flu, which was declared in 2009, caused hundreds of thousands of deaths worldwide, but early detection played an important role in stopping it from spreading further (Dalal *et al.* 2020). The development of rapid influenza detection kits helped medical personnel detect the virus in less than 30 minutes. During Covid, how important was mass testing for the United States? How effective was the country in testing and tracing individuals?

China officially reported cases of pneumonia in Hubei province in late December 2019, though it is now thought that cases may have occurred as early as September. The first case in the United States was reported on January 21, eight days after the first recorded case outside of China. A month later, a total of 426 tests was administered nationwide (Dyer, 2020). This

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average of 14 tests a day was obviously insufficient to understand the spread of the virus. If people are not aware that they carry the virus, they will not take the precautions to protect other people. The United States was not able to trace cases, and early action in testing and tracing is fundamental to saving lives in pandemics. The low number of tests was probably due to regulations the CDC put in place for the testing kits. In fact, at first only CDC-produced kits were authorized in the market. Unfortunately, its first several thousand kits contained a design flaw (Dyer, 2020). The Food and Drug Administration (FDA) then allowed private testing kits, resulting in a great improvement in detection. In the beginning of March 2020, the United States administered approximately 8,500 tests, about 15 times higher than the previous months' average (CDC, 2020). In May 2020, 99 percent of the tests were done by the private sector (Manabe *et al.*, 2020). Since August 2020, the U.S. has been performing more than a million tests per day.

This episode shows how government regulations may prevent the appropriate detection of a disease. The goal should not be to crowd out private firms, but to offer them incentives to produce more so that they minimize costs and lower prices. A more efficient way to make testing available would be to first make them more affordable. All the test kits that the CDC wasted represent a sunk cost added to the social cost of the lives that were lost. It would have been more productive for the U.S. government to have allowed the production of testing kits by anyone who could produce them to high-quality standards, and even to have encouraged their production through financial incentives.

The United States did a bad job at testing and tracing people with Covid-19. The CDC also neglected many ideas that seemed promising. Among them, I will focus on the Harvard Plan (Roadmap to pandemic resilience) and rapid home testing.

2.1. The roadmap to pandemic resilience (Harvard plan)

This plan, proposed by the Edmond Safra Center for Ethics at Harvard University, focused on speeding up testing to reopen closed businesses and activities as soon as possible. It favored massive testing and social isolation. The project had August of 2020 as a target for full reopening. Its hypothesis was that social distancing measures alone would cause future lockdowns, which are detrimental to the economy. In fact, prolonged lockdowns would certainly cause even higher unemployment rates than what the economy experienced. Its goal was to get 5 million tests per day in the United States and eventually to increase the number to 20 million per day by July 2020. These numbers were minimums, because the goal was to understand the movement of the virus to fully remobilize the economy. The actual peak of testing, in July 2020, was around 900,000 tests per day. We are still under a million tests per day nearly a year later. In other words, we were and still are far from large-scale testing, which is essential in tracing a pandemic.

Another aspect of the Safra Center plan was a Pandemic Testing Board to assure the supply of testing kits. Having a formal board for the supply of a

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good seems to be too complex for an urgent problem such as Covid-19. The U.S. government clearly failed in the supply of testing kits, but it was not for lack of a testing board. Therefore, a testing board does not seem necessary to trace Covid-19. As mentioned, CDC regulations and the lack of incentives for firms slowed population-scale testing.

2.2. Rapid home testing

Not knowing what you don't know can be hazardous. In the case of Covid-19, scientists discovered that people could carry and transmit the virus without having any symptoms. This asymptomatic aspect makes detection even more important. It is also not always convenient for people to leave their jobs or obligations to make appointments at testing centers. Rapid home testing could have been useful, especially early in the spread of the virus. Companies such as E25bio and 3M proposed rapid tests to provide results in under 15 minutes (Bailey, 2020). Their tests were like store-bought pregnancy tests. The problem was that the process to approve the prototypes was lengthy. The FDA only authorized the products in July 2020, by which time the U.S. already had millions of Covid cases. In the future it is desirable to have a way to speed up approval procedures in times of national emergency. One estimate is that rapid home tests for all Americans would cost around \$20 billion (Bailey, 2020). This type of population-scale testing would not only cost less but would help us get a sense of the trajectory of the virus.

2.3. Detection in Hong Kong, Taiwan, and South Korea

Hong Kong, Taiwan, and South Korea all had success with early Covid-19 detection. The United States is in a different continent than the early center of Covid-19, so if we want to learn something about the detection of the virus, it is useful to look at what countries close to China did to mitigate the risks. The common theme was that all adopted population-scale testing. In Hong Kong, testing supply was not an issue, and free testing centers were available to the population in the first days of the outbreak (BBC, 2020). Hong Kong managed to maintain the rate of infections at about 1 percent. Taiwan was also well prepared to fight the outbreak because it had learned from the SARS outbreak of 2004. Its National Health Command Center, which is responsible for action in this type of crisis, quickly introduced mass testing. I will discuss institutional preparedness later, but it is worth mentioning now once again that the United States was not ready because of federal negligence.

South Korean researchers argue that the country was effective in detecting Covid because it learned from a previous disease: Middle East Respiratory Syndrome (MERS), whose first outbreak occurred in 2012. South Korea's experience should be of particular interest to the United States because the key to its detection response was collaboration between the government and the private sector. South Korea made sure that the supply of tests was not an issue and built high-capacity screening and testing

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centers. Just a week after the first Covid case in the country, the Korean Disease Control and Prevention Agency asked the private sector to produce diagnostic tests. Thousands of test kits were circulating in the country a few weeks later. In addition, the country had around 600 screening and testing centers plus 150 diagnostic laboratories as of November 2020 (June-Ho *et al.*, 2021). South Korea achieved rapid cooperation between the private and public sectors more effectively than the United States did.

Two levels of testing exist when there is a pandemic. The first level occurs when there is an urgent need to prevent the spread of the virus. It is still possible to get the virus under control and trace individuals. If the first-level response fails, there is still an opportunity to limit damage. In fact, even if the disease is already widespread and no cure exists, testing can help slow the rate of infection. When more people get tested, they will know to avoid public places so that they do not infect others. The first level of testing requires minimal effort. Only a few thousand tests are necessary to track down the initial carriers of the virus. If the virus spreads widely, far wider testing is desirable. In a country like the United States, millions of tests per day would be required, as seen in the Harvard plan. The United States failed at both levels of testing, and this can partially explain why it experienced such high rates of infection. As predicted by the Safra Center project, the United States dealt with widespread infections by imposing extended lockdowns, which are detrimental to economic activity.

3. Prevention

The detection of a virus during a pandemic is necessary but not sufficient to gain control over its spread. Health officials also must find ways to prevent transmission from one agent to another. One can contract Covid-19 by touching or inhalation, so preventing transmission implies a series of behavioral changes. The CDC and many of its counterparts in other countries recommended that people adopt frequent handwashing, social distancing, cleaning of hard surfaces and wearing a mask. Travel bans were also one response many countries adopted, but we cannot really gauge their effectiveness since by the time they were imposed, the virus had already spread in various parts of the world. Handwashing and cleaning hard surfaces were relatively easy to adopt since they were already routine for many people. Also, their cost is small because they only require the purchase of fairly inexpensive goods by consumers in the private market. The United States and some other countries experienced shortages of cleaning supplies and protective equipment at the start of the pandemic; the next section discusses the role of the government in making these resources available.

The failure of early detection in the United States led to decisions that had strong negative effects on the economy. First, many businesses had to shut down due to social distancing measures and only essential workers were allowed to remain. The CDC defines essential workers as “those who conduct a range of operations and services in industries that are essential to ensure the continuity of critical functions in the United States.” Everyone else

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was either working remotely or became unemployed. The unemployment rate reached a peak of 14.8 percent in April of 2020. Although social distancing is a good way to “flatten the curve” of transmission, officials took too long to use unconventional fiscal measures to reduce the effects of lockdowns on the economy. An unusual situation like the coronavirus pandemic calls for openness to unconventional policies. The federal government and state governments could have been more flexible with a lot of businesses since the start of the pandemic. This lack of flexibility affected the production, distribution and consumption of goods and services during the pandemic.

Many small restaurants went out of business because of the risk that dining in represented for their customers. Despite their eligibility for loans, grants, and other supports, many also had to lay off workers because of increasing costs. Some restaurants had the possibility of shifting to another business model based on packaging and selling unopened food, like grocery stores. However, those that wanted to do so at the start of the pandemic found that it was illegal because of FDA regulations that prevented restaurants from labeling food for retail sale (Loria, 2020). By March 2020, the FDA eased the regulations to allow restaurants to sell their unopened food like grocery stores. This is an example of a reaction to take account of changing circumstances, but by the time it came into effect, many restaurants had already shut down. The authorization to allow more flexibility for businesses should occur early to facilitate the transition and reduce the costs. This is again an opportunity to emphasize the importance of procedures that would ease restrictions hampering business flexibility during pandemics.

A preventive measure that China took was building disinfecting stations for pedestrians and industrial workers. These stations are tunnels that detect and disinfect a person in as little as 20 seconds (Reuters, 2020). Having disinfecting stations along with adequate testing infrastructures would allow more workers, both “essential” and less essential to stay on the job. As mentioned above, when the virus is already widespread, large-scale testing can prevent transmission in social settings. Disinfecting stations, if effective, could also be used in schools, particularly in elementary and secondary schools, where many children do not understand the responsibility of wearing a mask. Enabling children to attend school safely reduces the burden on parents having to help students adapt to remote learning.

Many people with critical medical conditions died because they were not separated from Covid-19 patients. Healthcare workers were overwhelmed due to the high number of Covid cases. Doctors often had to make decisions to save some patients and let others die because resources were so scarce. Because of the coronavirus, hospitals received more patients than usual in intensive care units (ICUs), who brought a risk of contamination for non-Covid patients. According to Lisa Rosenbaum, a doctor at Brigham and Women’s Hospital in Boston, cancer patients have been disproportionately affected by Covid. Some of them require frequent visits for maintenance therapy, which were interrupted because of Covid protocols (Rosenbaum,

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2020). Therefore, it is important to find ways to isolate these patients to protect them. Contact with Covid patients is inevitable for most healthcare workers but oncologists or other special medical personnel could possibly be protected from direct exposure to the virus. Interruptions in the treatment of certain patients may have long-term impacts on their health. If possible, even a nationwide lockdown should not affect the treatment of this vulnerable population. The initial response of the U.S. healthcare system to this issue was in retrospect not satisfactory. As Dr. Rosenbaum stresses, doctors had to make the difficult decision of whom to save first. The way to avoid this dilemma was to have special units for Covid cases only. It was not feasible in the beginning of the pandemic due to a shortage of protective equipment, hospital beds and medical personnel. This shows the importance of preparedness and is in my view, the main lesson to learn for future pandemics. South Korea managed not to make the same mistakes twice after what its healthcare system learned from MERS. By collaborating with the private sector, it produced adequate quantities of protective equipment, masks, and other essential goods.

The CDC bears substantial responsibility for the failure to detect and prevent the spread of Covid-19 in the United States. However, the roots of this failure are not directly located in the institution itself. The FDA only started easing regulations several months after the start of the outbreak. In the meantime, unemployment roughly quadrupled, and thousands of people died. The problem is not only the CDC acting as a monopoly but the lack of speed and built-in institutional capacity in the responses. In the future, for example, the procedure for easing packaging regulations during lockdowns should be fast and effective rather than a complex system costing billions of dollars to the food industry.

In 2018 the White House reorganized its pandemic response team, merging it with another group. It was an unfortunate move considering the importance of pandemic preparedness. The team was formed after the government received criticism for its response to the Ebola outbreak that began in 2013 (Caldera, 2020). Despite this fairly recent experience, the United States was not well prepared for a pandemic. Perhaps we underestimated the benefits of preparation relative to the costs incurred by such a widespread disease.

4. Production and distribution (domestic and international)

The main economic principle highlighted in this section is scarcity. Knowledge and certain basic resources have been scarce during our experience with the coronavirus. This section focuses on the scarcity of the resources essential to containing Covid.

Despite the confusion that arose at the start of the pandemic, scientists around the world proposed ideas to address the virus. The last section discussed the “guidelines” suggested by the CDC. For the public to adopt

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the behavioral changes, it was necessary to have certain health-related goods and services available and affordable. When Covid started to seriously hit the United States, demand spiked for some of those goods and shortages became chronic; supply almost never met demand for months. There was not enough hand sanitizer, protective equipment, and masks for both the population at large and for medical personnel. The U.S. Department of Health and Human Services maintained a Strategic National Stockpile (SNS), a reserve of drugs and medical supplies that the federal government can distribute to the states in the occurrence of public health crises. The stockpile was not adequate at the start of the pandemic for many reasons. First, it has an history of being underfunded (Gerstein, 2020). The lack of funding results in inadequate supplies for a rapid response by the federal government. Another problem was the weakness of the supply chains of the SNS. The stockpile did not have the right amount of resources to distribute to all the states at the start of the pandemic. Most states experienced shortages of N-95 masks, hand sanitizer and personal protective equipment (PPE). Indeed, the experience with Covid-19 showed that the stockpile needs stronger and less complex supply chains. The process of identifying the needs of each state should be fast and effective. The lags in deployment of supplies to the state and local governments also contributed to the failure of distribution of essential health-related goods. One way to deal with this issue would be to have an independent body regularly focusing on the status of the stockpile and publishing annual reports. Just as there is a regular indicator that measures the country's output (gross domestic product), reports on the stockpile could be viewed as an approximation of our preparedness. I specified that the body should be independent to try to reduce the political influence as much as possible. For example, states should not receive supplies according to their affiliation with the federal government but based on their actual needs.

The Strategic National Stockpile is a great resource for pandemics or natural disasters. It can respond immediately even if the crisis was not expected. However, solely relying on a reserve of finished products would be a mistake. We will probably never be able to predict the exact amount of goods we need for each pandemic. The right approach is to keep the stockpile at a level appropriate for an initial response for a disease of the magnitude of Covid. We can see the stockpile as a complement to the active production of goods during public health crises. The scarcity of resources at the start of the pandemic was not only due to the flaws in the stockpile. It also had to do with slow national production that took some months to keep up with demand.

Thinking about national production does not imply that it is the responsibility of the government to monopolize either production or purchasing in a pandemic. Section 1 mentioned how CDC regulations created a shortage of testing kits in the United States. Rather, government should cooperate with the private sector to facilitate nationwide production. The most critical tool that the U.S. government possess in unusual times like

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Covid is the Defense Production Act. The goal of this legislation is to incentivize businesses to accept government contracts and prioritize the production of scarce materials (McIntyre, 2020). President Trump did apply the Defense Production Act when the pandemic started but did not fully utilize it. When he signed it on May 18, 2020, he claimed that it was “just in case we need it” (Farley, 2020). Perhaps the administration underestimated the magnitude of the virus. By the time the Defense Production Act came into effect, daily cases and deaths were already ramping up. Thus, as the economist Richard McIntyre (2020) has observed, President Trump failed to act like a wartime president. Underestimating the pandemic slowed the reaction of the United States to the “attack” of the virus. Trump also hesitated to invoke the act because he saw it as the nationalization of U.S businesses. Others are skeptical about the invocation of the Defense Production Act because there exist simpler ways to incentivize businesses. Vouchers and subsidies can signal the market to increase supply. The purpose of the Defense Production Act is to enforce cooperation between the state and the private sector to ensure an adequate supply of scarce resources. For future pandemics, authorities should be fully aware of both the potential advantages and disadvantages of applying the act.

Proper maintenance of the Strategic National Stockpile and correct application of the Defense Production Act can both help the United States to deal with the economic problem of scarcity. Policy makers should also consider revising regulations that slowed down production of key goods during Covid-19. For example, when the country experienced the initial shortage of hand sanitizer and disinfecting wipes, companies that produce alcoholic beverages wanted to produce some of these goods. Even though they had the technology, many state and federal regulations prevented them from entering an untraditional market. As I noted, an unusual circumstance like the coronavirus calls for unconventional policies. Government should be pre-disposed to loosen certain regulations to boost production when the country needs it. Even though the Food and Drug Administration eventually lifted one of the major regulations impeding beverage makers, the policy lag caused the shortage to persist. (Wiand *et al.*, 2020).

Now let us talk about the most fundamental production that had to happen during Covid. Hand sanitizer, masks and personal protective equipment are all good preventive materials against the coronavirus. However, there would be no hope for a return to normal without an effective vaccine. Since the virus was new, there was no stockpiled supply of Covid-19 vaccines. Rather, the objective was to find a vaccine as soon as possible. As much the U.S. federal government deserves criticism for its slow reaction to the pandemic, it was effective in spurring production of a vaccine in a short period. A big reason was that Operation Warp Speed funded multiple vaccine companies rather than putting all funding behind a single government or private effort that might have failed.

Thanks to rapid development and production of vaccines, vaccination began in late 2020. There were distribution hurdles from the federal

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government to the states. The supply of doses to the state and local governments was complex because it involves multiple bureaucratic steps (Farley, 2020). Indeed, an effective way to boost the distribution of vaccines would be to make the transition as simple as possible.

The Biden administration had a vaccination rate goal of 70 percent before July 4, 2021. As of July 8, approximately 67 percent of Americans had at least one dose of the vaccine (Bebinger & Farmer, 2021). Even though vaccine suppliers are producing fewer doses than they were paid for, the issue is apparently on the demand side. Many people are still hesitating about taking the vaccine because they are skeptical about its effectiveness or concerned about side effects. Some states have offered incentives to citizens to try to increase the vaccination rate. They range from dinner with a state governor to a \$1.5 million prize. There has not been a lot of research on the effectiveness of these incentives, but a group of economists found that Ohio's Vax-a Million campaign increased vaccination by 50,000-80,000 people in just two weeks (Brehm *et al.*, 2021). The campaign is a lottery system with weekly drawings promising a vaccinated winner a prize of up to \$1 million (National Governors Association, 2021). Thus, offering incentives to citizens can increase the uptake for vaccines.

Last, it is important to talk about the international distribution of the vaccine. If some countries do a great job at vaccinating the population and the rest of the world does not follow, the pandemic will not stop until most people have been infected, and more people have died. Therefore, international cooperation is very important. Donating doses to poor countries is a good idea as long as it involves minimum waste. For example, Malawi and South Sudan received doses that they could not store because they did not have the essential equipment. Wasted doses not only represents a sunk cost for both parties but decrease the likelihood of controlling the virus quickly at the global level. The ideal approach for future pandemics would be to fund research that can find simpler ways to store vaccines, or vaccines that are easy to store. In addition, countries with surplus of doses willing to donate should shift their attention to the areas where the virus represents a bigger problem. Some of the doses that went to waste in Africa could have been used for countries such as Brazil and Peru with higher cases per capita. The limitations of this approach are the domestic politics of the countries concerned. If a government or the nation does not believe in the effectiveness of a vaccine, distributing it to them will generate even higher costs. In July 2021, the Group of 20 (G20) countries met to discuss funding for pandemic preparedness. A report prepared for their meeting observed that international cooperation should be enforced for future pandemics and many gaps needs to be filled in terms of global pandemic preparedness (G20, 2021).

5. Research and publicity

The detection and prevention of a virus may not succeed for various reasons. I already discussed the tardiness of the response of the United States

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and the lack of cooperation between the government and the private sector. An additional barrier to containing the virus is the circulation of information: people must be properly informed about the necessary precautions.

The United States confirmed its first case a month after the first reported case in China (Dyer, 2020). How effective was the CDC in informing the population about the danger of Covid-19? Did the population receive clear instructions from both federal and state authorities? As seen in Section 2, the first guidelines the CDC issued stressed frequent handwashing and social distancing. There was also a series of campaigns attempting to provide accurate information about the disease. Slogans such as “six feet apart” or “quarantine,” related to CDC guidelines, became more popular at the start of the pandemic (Dingtao *et al.*, 2020). The CDC succeeded in providing some guidance to the population. Unfortunately, much misinformation circulated about the virus. We cannot say if it circulated more than the correct information, but the population did not know how dangerous Covid could get. Many people were opposed to the CDC guidelines and did not believe in the disease (McGreal, 2020). President Trump himself frequently claimed that the virus was under control, and it would disappear within a few months. Attitudes towards the disease became politicized in the United States and to a lesser extent in some other countries.

Each crisis represents an opportunity for the government to be better prepared for the next one. South Koreans understood that rapid testing and tracing is the key to controlling the virus in its early phase after their experience with MERS. The country already had a system put in place to increase the production of testing kits and protective equipment (June-Ho *et al.* 2021). The United States also had experience with similar diseases but still failed to convince the population about the threat of Covid-19. As Bourne (2021) notes in his book *Economics in One Virus*, the United States has been persistently weak in pandemic preparedness. For example, in a 2014 report, the Department of Homeland Security questioned the country’s readiness for a pandemic because they found many flaws in the stockpile (Bourne, 2021, chapter 10).

We knew a pandemic could come anytime but we were still not prepared, so the problem was not the availability of information. Therefore, there must be other explanations for the lack of publicity for Covid-19. One is that 2020 was presidential election year and candidates were in full campaign mode. Then-president Donald Trump initially saw Covid-19 as a tool for his opponents to criticize his administration. Indeed, he often urged his followers not to take the virus seriously (McGreal, 2020). He was not alone in either major political party. Politics detracted from what was important: controlling the virus, as soon as possible. Partisanship also occurred in several media outlets, which were contradicting one another, and this was not ideal for the education of the population on the virus.

Bourne (2021) also mentions something that can explain the lack of publicity for Covid-19 at the start of the pandemic. He believes that the United States was not prepared because of political incentives. Politicians are

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often rewarded for their response to a crisis, but the public is rarely interested in their preparedness (Bourne, 2021). Thus, there were no real incentives to educate the population about the possible effects of Covid-19 when the United States was not yet hit by the virus. In future pandemics, we must be aware of the political challenges because they represent a significant barrier to an adequate reaction. The response strategy must be independent from any political agenda. There must be competent and credible public health experts guiding the reaction. In addition, the population was confused throughout the pandemic. While states issued stay-at-home orders, the political climate at the time led citizens to protest. There were no ways to safely exercise this constitutional right because protesters were not able to practice social distancing. I do not imply that people should not have protested during Covid. Rather, authorities should be clear on the message they transmit to the population. The initial guidelines discourage people from attending any large gatherings. Suddenly, after the death of George Floyd on May 25, 2020, many public health officials reversed their guidance and endorsed attendance at large public protests demanding social justice. There was no uniformity in the message for the population, which hurt the credibility of public health experts. Perhaps mass testing and disinfecting stations would allow stay-at-home orders to be less restrictive.

Given the dispersed nature of knowledge, we did not know how to deal with Covid-19 before it hit the country. Most of the knowledge we have now was generated by markets. We might witness something like Covid-19 in the future, but we might also be afflicted by a completely different disease. The best approach is to assume that at least some of them will be like it. There has been considerable research about medical and behavioral responses to Covid-19. The findings help identify what worked and what did not during the pandemic. Therefore, new research on Covid-19 offers us a range of possibilities for future pandemics, from testing to public health guidelines. The most important scientific outcome of the pandemic is the Covid vaccines developed by several firms. Relying only on the preventive measures and the production of key materials would not be sufficient considering how the virus had already spread. The alternative would be to let herd immunity develop naturally, but doing so would probably cause what almost everyone would consider too many deaths. To repeat, it was a good decision by the U.S. government to fund multiple companies through Operation Warp Speed without knowing which vaccine would be the most effective. Some other countries also funded their own researchers or drug makers, giving the world even more choices. The cost of funding extensive vaccine research is low compared to the benefit of saving lives with effective vaccines. If one or some turned out to be ineffective, it would be outweighed by the benefits of protecting the world population with just one working vaccine.

There are currently three companies producing vaccines for the U.S. with different levels of efficacy. Most vaccines require at least two doses for the patient to be safe against Covid. As of August 9, 2021, though, only about 50.8 percent of the U.S. population is fully vaccinated against the virus (Our

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[World in Data, 2021](#)). To speed up vaccination, one possibility is fractional dosing, the injection of just a fraction of the full dose to the patient. Tabarrok *et al.*, (2021) argue that fractional dosing could significantly increase the global vaccine supply. Their hypothesis rests on the fact that a fraction of the dose of some Covid vaccines is more effective than a full dose of another. For example, a full dose of a highly effective vaccine could be divided into two or three, which would double or triple its supply. One limitation is that firms are not incentivized enough to pursue trials on this possibility because they could potentially lose money (Tabarrok, 2021). Fractional dosing seems well worth trying as a way to increase the vaccine supply, particularly in countries behind in vaccination campaigns.

Research on Covid has many positive externalities for treatment of other diseases. The technology used to develop Covid vaccines gave scientists a starting point to treat previously incurable conditions. For example, the company Moderna is currently working on vaccines against HIV and Zika thanks to the development of their Covid-19 vaccine. This research will also help in the fight against different types of tumors (Bailey 2021). In addition, BionTech is using technology involved in the Covid-19 vaccine to find treatment for breast and ovarian cancer (Bailey 2021). These developments suggest that the knowledge spillovers make the investment in Covid research even more cost-effective than it looked at the start of the pandemic.

6. Costs and conclusions

The U.S. government has so far spent \$5.32 trillion in its response to Covid-19. Of that amount, though, \$690 billion was on the health sector, and of that, only a modest amount was for vaccines. The government has also provided \$510 billion in liquidity support.

Fiscal spending by the rest of the world combined is estimated at \$4.61 trillion (IMF, 2021). Thus, the United States has spent more than the rest of the world combined to respond to Covid. Only a small portion of fiscal spending in the United States and elsewhere was allocated to the health sector, which seems to be a case of underfunding. Lockdowns saved lives but also imposed high costs in terms of lost national income. Looking at the increasing unemployment rate during Covid and the decrease in consumption, we see that extended lockdowns had substantial opportunity costs. Thus, lockdowns should be temporary rather than prolonged and uncertain.

The benefits of adequate preparation clearly seem to outweigh the costs, even just looking at the United States alone. Suppose that a fraction of the more than \$5 trillion spent on responding to Covid had been devoted to pandemic preparedness. To illustrate, let's say there are ten factories, scattered across the country, that can mass-produce protective equipment, masks, and other essential materials. They are idle unless there is an urgent need like a pandemic or natural disaster. If the average cost of maintaining these mothballed factories is \$500 million each, the total cost of keeping them in reserve would be \$5 billion per year. At that rate it would take 200 years

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for the factories to cost the government \$1 trillion, i.e., 17 percent of the total spending on Covid in just a year. Thus, the United States and many other countries should revise their estimates of the benefits of preparation to avoid even higher costs. We cannot affirm that Covid-19 would be totally under control if we had such facilities at the start, but at least we would have had a head start. The focus should not be on what we could have done but what we currently know and how can we use it for the future. To repeat, pandemics are not always predictable, but preparation is key.

Summary of lessons

The U.S. response to Covid lacked flexibility. Institutions and regulations often frustrated rather than facilitated appropriate responses.

Countries that did better than the U.S. in the beginning were more effective at using knowledge from previous diseases.

The public health message to the population about Covid-19 was inconsistent. Inconsistency in turn created confusion and chaos.

Funding for research on vaccine storage was low. If countries do not have the proper equipment to store doses, there will be a lot of vaccine wastage.

There was a clear lack of collaboration between the private sector and the federal government; the monopolization of several markets by the government created shortages of certain essential goods.

Many existing regulations halted the production, distribution, and consumption of key items in the fight against Covid.

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