Vaccinating America

In December 2020, one year after the COVID-19 virus had been reported in China, the Food and Drug Administration (FDA) granted emergency use authorization in back-to-back announcements for the Pfizer/BioNTech and Moderna/NIAID vaccines. This was by far the fastest vaccine development in history. A typical vaccine took 10 years to develop, with the most rapid previous development being the four years it had taken for the mumps vaccine in 1967. And these two vaccines were of a new type, utilizing messenger RNA (mRNA). While mRNA had been studied for years, the unique spike protein of the coronavirus that causes COVID-19 provided a first opportunity to respond with an mRNA vaccine.

The ensuing technological and scientific success could not have been accomplished without the collaboration of the private and public sectors. The distribution of the vaccine nationally could not have been accomplished without the major delivery companies stepping up to meet the challenges of on-time distribution of the vaccines, which required very cold storage. The research, development, and nationwide distribution of the vaccines has evoked comparisons to the private-public sector collaboration during WWII that led to the Manhattan Project’s rapid and dramatic scientific breakthroughs. After death tolls climbed into the hundreds of thousands, the vaccine announcements provided hope that there may be light at the end of the very dark COVID-19 tunnel.

By the end of May, the United States is expected to have sufficient vaccine supply for the entire adult American population. But the challenge to manufacture, distribute, and administer the vaccinations quickly, efficiently, and fairly, in a race against continued infection and the emergence of variants of the virus here and all around the world, requires continued collaboration between the public and private sectors. The US and the world must win that race between vaccination and mutation to achieve “herd immunity” and return to normality in daily life and the economy. The stakes are high for both the current crisis and the inevitable pandemics of the future. For this reason, the following analysis offers a diagnosis of the current episode, and recommendations for today and tomorrow.
Policy Recommendations:

Insights for what’s ahead

States needs standby surge production capacity. The nation must also be prepared to bring vaccine manufacturing to scale far faster if the next coronavirus is more virulent and equally or more transmissible. The US government and the private sector must continue their investment in research and development, and build standby vaccine production capacity as a matter of national security.

Manufacturing supply chains must be kept intact. Immediately and for this pandemic, monitoring the availability of key vaccine manufacturing supplies—pharmaceutical-quality glass, stoppers, dilutants, and “low-dead-space” syringes, as well as personal protective equipment (PPE)—is essential, along with backup plans to quickly mend any breaks in the chain. While market economy forces should be the key drivers of matching supply with demand, targeted government intervention to ensure supply chain resilience during a global crisis may be necessary.

Data management is crucial. Efficient delivery of vaccinations requires knowledge of where the need for vaccinations is, when vaccine will flow there, and how much will be available. That information must be available at all levels of the distribution network. And improvement of the vaccination process, as well as assessments of its fairness, and timely delivery of second doses, require knowledge of when vaccinations were delivered, and to whom. With decision-making authority sometimes held by the states, and sometimes divided between states and localities, there must be accurate and rapid recording and sharing of the data that are collected at different levels of government in different states. Overall coordination and data collection are essential. Improvement of distribution information and collection of in-arm vaccination data is essential, and must be a federal function to achieve nationwide comparability.

Different delivery mechanisms are suited to different populations. Different people and regions respond to different delivery systems, which puts state governments (with private-sector collaboration) front and center in the organization and coordination of their delivery systems. The most successful states have used those systems that connect best with the major segments of their populations. Existing private health care provider networks can quickly reach their existing populations through existing logistical channels, and have not been used to their fullest potential. Mass vaccination sites can reach large numbers of willing, mobile people quickly and efficiently. But they are difficult to establish, and are not accessible to many vulnerable and underserved populations. Trusted institutions such as pharmacies, churches, and individual physicians can reach out to communities and vulnerable populations and counsel the reluctant. But having multiple and apparently competing sign-up systems can be inefficient, ineffective, and demoralizing, and can easily be taken as evidence of randomness and unfairness. Faulty sign-up systems must be improved—and significant support is being leveraged from private-sector companies with extensive digital assets—but federal coordination and perhaps investment may be needed for better crisis coordination that could be linked to data-collection systems.

Targeting versus speed. Delivering the limited supply of vaccine to vulnerable groups saves lives directly. But vaccinating the general population slows the spread of the virus, and saves lives indirectly. Evaluation of the different strategies used during the current pandemic can help to guide...
future choices, based on the availability of vaccine. An evaluation can also play an important role in addressing equity issues in health care overall. Distribution systems must ensure prompt use of doses without wastage.

**Prepare for the next pandemic.** This nation has chronically underinvested in several dimensions of public health, especially in light of the vulnerability of population groups because of the social determinants of health. These broader societal determinants of public health must be addressed. The Strategic National Stockpile must be rebuilt promptly for future viral—not only bacteriological, or bioterror—pandemics. Before the next pandemic occurs, PPE can be purchased for the stockpile from anywhere in the world, and global cooperation will be essential; but because global pandemics interrupt supply chains and induce producing nations to hoard supplies for themselves, the United States needs standby surge production capacity. The nation must also be prepared to bring vaccine manufacturing to scale far faster if the next coronavirus is more virulent and equally or more transmissible. The US government and the private sector must continue their investment in research and development, and build standby vaccine production capacity as a matter of national security.
What Can We Learn from the Vaccine Roll-Out Thus Far?

The Manufacturing and Supply-Chain Challenge: Most, if not all, of the complexity in the vaccine distribution system stems from insufficient supply of vaccine. Prioritizing among recipients to protect the most vulnerable becomes critical when the availability of additional vaccine doses is further in the future, and especially when their very arrival is uncertain. Yet the more detailed and restrictive the prioritization, the more potential for error in the distribution, and the more confusion and frustration for citizens.

The prospect of sufficient vaccine for every adult American by the end of May was in significant part the result of a private-sector partnership orchestrated by the US government under which Merck would manufacture the recently authorized Johnson & Johnson (J&J) vaccine, using the Defense Production Act to refurbish two Merck facilities to do so. Cooperative arrangements within the private sector, such as that between J&J and Merck, are relatively routine; J&J already had contracts with other firms to expand its production capacity. However, the scale of the Merck arrangement is large, and at this crucial time there is surely an unusually strong motivation to achieve the highest performance in the public interest. The federal government also provided support so that J&J could expand its vaccine manufacturing operations to 24 hours per day. This was necessary because J&J’s own production was behind schedule (although the company expressed optimism that it could catch up over a few months).

But J&J’s production issues were not unique; initial deliveries of both the Pfizer and Moderna vaccines also fell behind schedule. Experts report that all vaccine manufacturing, even that of conventional vaccines against familiar diseases, can be problematic, and very complicated. Furthermore, the large-scale manufacture of the mRNA vaccine is both highly complex and previously untried, thus requiring manufacturing innovation first, and then time-consuming “learning by doing” to bring the manufacturing up to the unprecedented scale necessary to provide a major contribution to immediate inoculation of the entire population of the planet. These manufacturing feats could not have been accomplished without the rapid innovation of the private companies on the front lines. But the risks would not have been undertaken without the purchase guarantee provided by the US government.

Beyond manufacturing per se, securing the supply chain—fluids for dilution, pharmaceutical-quality glass and stoppers for the vials, syringes (especially specialized low-dead-space syringes that extract more of the vaccine from a multi-dose vial), and transportation—has been a challenge in the urgent vaccination process. Again, the lesson is that government intervention may be necessary to secure vital supply and distribution chains in a crisis.
To maintain at least the current pace of supply, distribution and inoculation is critical. At present, the average number of US injections per day is about 2.5 million (see Chart 1 below).

**Chart 1**

**Trends in Number of COVID-19 Vaccinations in the US**

Assuming that the current pace is maintained, 70 percent of the US population will have received at least one shot (making no distinction between the one-shot and two-shot regimens of different vaccines) by early July, as shown in Chart 2 below. That 70 percent level of immunized persons is approximately the level many authorities characterize as “herd immunity.”

This timeline could move faster or slower according to the availability of vaccines and their distribution, including the willingness of individuals to be vaccinated. (It understates population immunity to the extent that some persons have been infected without knowing it, and have acquired immunity that way without being vaccinated. However, these projections overstate population immunity to the extent that new variants of the virus achieve the ability to infect people who have been vaccinated.)

**Distributing the Supply:** By many accounts, the US vaccine distribution system has suffered from a lack of organization in several respects. The federal government has at times been less than fully informed about where its vaccines are, state governments have been less than fully clear about where the vaccines are going and when, and private-sector distributors have not been fully activated and utilized. Patients on the ground have therefore been both disappointed and put at risk, while vaccinators have lost time that could have been put to life-saving use, and precious vaccines have spoiled and been wasted.  

In the beginning, the federal government made commitments to buy large quantities of vaccine, to be distributed to individuals free of charge. The distribution mechanism began with deliveries to the states following a simple formula based on adult population. The Centers for Disease Control (CDC) provided guidelines, but not binding requirements,
to prioritize distribution to vulnerable groups including frontline health care workers, residents in long-term care facilities, essential workers, and others.

States (and sometimes localities) themselves interpreted which health care workers were “frontline,” which workers were “essential,” and which other groups should be prioritized. For that matter, there were generally no firm counts or censuses of residents of long-term care facilities. This led to inaccuracies in the allocations of vaccines intended for nursing home residents, which itself slowed the process and wasted some vaccine doses. In particular, overestimates of the number of long-term care residents and staff willing to be vaccinated led to an excess of doses being put in storage and not quickly reallocated. (In Ohio, 60 percent of nursing-home staff refused vaccination.)

In the vast majority of instances, states and localities turned over their vaccine supplies to private entities to perform the actual inoculations. For example, most of the vaccinations in nursing homes were performed by pharmacy chains. There were numerous instances when existing private health care networks and providers could have delivered inoculations quickly and efficiently, but were not empowered to do so.

A great deal of the problem with US vaccine distribution for some time boiled down to a lack of accurate information. States contended that they did not have adequate notice about when vaccines would arrive from the federal government, or how much there would be, and that allocations sometimes changed on short notice. The new presidential administration responded to this lack of coordination and information by taking greater control of the process, in particular by promising three weeks’ notice of delivery amounts. This has improved distribution, but has by no means perfected it. The federal part of the program entails deliveries directly to pharmacies, long-term care facilities and Federally Qualified Health Centers. The theory is that these shipments cut out the distribution middleman, making deliveries quicker and more direct, and unburdening the states of that task.

Another front in the information war is personal willingness to receive the vaccine. According to a Monmouth University poll in mid-March, about one in four, or 25 percent, of people surveyed are “unwilling” to get the vaccine, despite roughly 60 percent of respondents reporting largely favorable perceptions of the vaccine rollout so far. Many Americans, Black Americans in particular, have long-standing suspicions about the medical system in general. Recent questions about the accuracy of clinical trial data for the AstraZeneca vaccine do not help in building the necessary public trust. Rumors about side effects must be countered promptly with facts from respected sources, understanding that some reactions will occur and that the public must be presented with an accurate risk-reward balance.

Data: For the above reasons, program administrators need a data-management dashboard that provides comparable information for every decision-making jurisdiction. Collecting data during the vaccination process may seem to be a distraction from the primary task, and so it has often been given short shrift in practice. But it is essential to efficient and correct ultimate delivery of vaccinations. Because the federal government initially ceded program management to the states, and some states in turn ceded responsibility to localities, data management has been highly complex. The need for comparable data across jurisdictions, with responsibility residing at different governmental levels in different states, strongly suggests that the design of the system will need central
coordination. And yet a newly designed federal government–sponsored data and reservation system has reportedly performed poorly, leading to delays, and many states have abandoned it, reducing data availability further.

To guide program improvement, and to ensure fairness and reassure the public, vaccination data should be available by county, race, and gender (consistent with patient privacy, and adding to the workload and complexity on the ground). The CDC Social Vulnerability Index could be used in conjunction with the data-management system to focus program strategy (which some states already do to allocate doses within their borders), including the allocation of the vaccine itself among the states (in lieu of the simple per-adult allocation that was employed initially).

A further possible step would be the identification and potential later verification of persons who have been inoculated, including in travel documents. If pursued, such a tracking collaboration must be done consistent with patient privacy and the confidentiality of any individual medical records, and must not be a step toward discrimination against less-affluent communities.

**Vaccination and Vaccinators:** A potential bottleneck in the vaccination process is the number of qualified vaccinators. Naturally, the many health professionals working overtime to treat COVID patients cannot also administer vaccinations. Government at all levels has contributed to filling this inevitable gap with regulatory relief that empowers licensed personnel to practice across state and local boundaries, and calls forward retired practitioners, dentists, veterinarians, and other qualified personnel such as trained members of the military or the National Guard, to contribute their time.

**Transportation:** Other tasks in the process include getting homebound persons to vaccination sites (or vaccinators to the homebound patients). Mobile vaccination clinics have taken vaccines to people, which is now easier with less stringent temperature and storage requirements, particularly for the J&J vaccine. Private entities with large meeting facilities, such as stadiums, have simplified this process by making their facilities available as mass vaccination sites. Ride-sharing and other transit companies have volunteered free or discounted rides.

**The Trade-Off between Targeting and Speed:** CDC guidelines prioritized health care providers and the populations in long-term care facilities (who were disproportionately harmed by the initial wave of the virus). Some health care facilities prioritized only persons who worked directly with COVID patients, while others vaccinated all employees. The definition of “frontline workers” is subject to interpretation, as is that of “other essential workers.” There was no existing census or enumeration of residents of long-term care facilities, or even of the long-term care facilities themselves.

States and localities that clung to the strategy of prioritization, therefore, had a far more complex task than those that chose early on to reach out more broadly to simplify the program. And there are substantive arguments both ways. Quite simply, vaccinating the vulnerable populations first saves their lives, all else being equal. But all else is not necessarily equal, because more rapid vaccination of the population at large would reduce the spread of the virus, even if many of the vaccinated people would never have become symptomatic even if they became infected. There was an unavoidable trade-off that
policymakers and program administrators simply had to make in a real-time crisis. But future planning will be strengthened by data analysis and evaluation of which methodology has worked best to prevent the spread of this virus.

What Went Right, What Went Wrong in Individual States: Arguably, the allocation of vaccines among the states has been less than optimal (although under the extreme time pressure, using a simple rule of thumb may have been the only feasible choice). However, some states or localities more rapidly deployed the vaccines they received than others did.

West Virginia: Success was driven by centralized state leadership and collaboration with public and private stakeholders. West Virginia early on took control of the distribution process. It mobilized the National Guard for leadership and transportation services. It opted out of the federal program that prioritized nursing home residents via chain pharmacies, recognizing that its sparsely populated landscape featured mostly smaller, independent pharmacies and other retail stores. It instead started with a broad prioritized Tier One population, including first responders as well as health care workers; this gave the state more arms in line to receive the early deliveries of vaccine. West Virginia’s early results were among the best in the nation. The state achieved this even though it made vaccination appointments only after doses were already on hand, causing some delay. Also, many of its non-tech-savvy citizens have clogged telephone networks, and even its internet-capable population has been frustrated in having to navigate multiple sites in search of available appointments.

New Mexico: Early development of information networks was successful. One issue nationwide was the registration system for individuals. New Mexico set up a website well before vaccines were available, and urged citizens to register immediately. This got setup problems out of the way ahead of time. Providers entered their availability into the same system to match supply with demand. New Mexico also geared its system more toward getting shots in arms rather than prioritizing among arms, and that aided speed. In contrast, Georgia’s internet reservation system had significant startup difficulties once vaccines arrived (as did many other state systems—reminiscent of the slow improvement of the signup system under the Affordable Care Act). Again, the original federal system offered to the states had serious flaws, and several states, including California, South Carolina, and Virginia, have dropped it. Alabama (like some other states) opened a telephone system only when the vaccines became available. It was immediately overloaded with calls.

Alaska/South Dakota: Established public and private health systems provided reliable and effective delivery systems. Alaska benefited from an already well-established public health system that delivered much of the state’s care even before the pandemic, and that system merely rolled vaccination into the existing structure. Alaska clearly faces substantial challenges with its terrain and widely dispersed population, but its health system was already built to surmount those challenges. South Dakota also achieved good results, but with a different approach. The state has three main private health care delivery networks, and it gave those networks the lead to manage the early distribution to their regular enrollees in an efficient manner. The state’s three private health care systems have been able to capitalize on their existing patient relationships and logistics with greater transparency and less friction than in many other states.
Arkansas/Missouri/Connecticut: A balance between speed and the ability to target vulnerable populations must be achieved. Arkansas has reportedly been less successful at this. It very early on built pharmacies into its distribution plan. According to at least some interpretations, that interacted unfavorably with the prioritization of vulnerable populations, because pharmacists sat waiting for either vaccine doses or eligible individuals to show up, slowing the actual delivery of injections. But different distribution vehicles work better in different settings. Pharmacies have proved highly efficient once the small and often homebound targeted populations have been vaccinated, and the system can reach out to much larger and mobile groups. Trusted community pharmacies can also be effective in convincing vulnerable groups to seek vaccination.

In contrast, Missouri set up mass distribution sites, but did not locate them optimally for underserved communities, and also did not overcome the vaccine resistance that some groups feel. Trusted institutions, such as churches, schools, health care providers, or pharmacies, can conceivably achieve such effective outreach.

Mass vaccination sites have proven effective under some circumstances. In Connecticut, the state and its Department of Public Health cooperated with local health departments, major hospital systems (which created their own weekly informational conference calls), federally qualified health centers, and private-sector leaders, which led to the early establishment of large vaccination clinics. A disused airfield in East Hartford has been one of the most prolific injection delivery sites. It works well for people who are willing to be vaccinated and have access to cars, to the extent that enough qualified vaccinators can be recruited, which can pose a crucial constraint. (In other locations, a large sports arena or auditorium accessible by public transportation can circumvent the need for a car.) Organizers note that a doctor’s office may be a more amenable site for a reluctant patient.

Florida: Setting its own eligibility guidelines had advantages and disadvantages. Florida attempted to accelerate its vaccination process by opening it up early to all citizens 65 and over, and administering doses on a first-come, first-served basis. The result was successful in some locations in the sense that available doses were injected into arms. But that was accomplished at the cost of long lines hours before facilities opened, with many people eventually sent home without vaccination when supplies ran out. Thus, this arrangement achieved speedy administration at the cost of some measure of public frustration and distrust. Another source of public dissatisfaction came from differences in policy between states and their localities—as was evident in New York State between the state, New York City, and the state’s counties. In Florida, the state left the counties to handle their own logistics—with the result that some made vaccination appointments using common party-invitation software. Thus, despite some local success, the overall state results were not at first favorable.

Lessons Learned: The central lessons of the states’ experience thus far include:

- First and foremost, establishing central leadership on the state level in collaboration with the private sector can be a critical component of success.
Without sufficient vaccine, not only will the process be slow, but citizens will also be frustrated, dissatisfied, and increasingly less compliant with safe behavioral standards.

Vaccinating long-term-care populations anywhere is difficult and time-consuming, and as long as vaccines are scarce and the vulnerable are prioritized, progress will be slow.

Even after vaccines become more available and the homebound population is inoculated, states will still differ with regard to the density and technological savvy of their populations, and in how their different populations respond to different delivery systems. The most successful states have used the systems—sometimes multiple ones—that connect best with the major segments of their populations.

Existing private health care provider networks can quickly reach their existing populations through existing logistical channels, and should be utilized more widely.

Mass sites are difficult to establish, but they can reach large numbers of willing, mobile people quickly and efficiently.

Trusted institutions such as pharmacies, churches, and individual physicians can reach out to communities and counsel the reluctant.

Although having multiple vaccination vehicles can be necessary to reach both large groups of people and targeted, vulnerable, and underserved populations, having multiple and apparently competing sign-up systems can be demoralizing, and can easily be taken as evidence of randomness and unfairness. Many members of vulnerable communities do not have internet access, making the reservation process difficult and contributing to distrust.

While diversity in delivery vehicles is necessary, the need for comparable data is universal. The vaccine distribution and administration process will be much improved if and when a consistent, reliable, and easy-to-use data-management system is made available; and if that happens, it must almost certainly be at the initiative of the federal government, which is not there yet.

The Role of the Private Sector Is Essential

Some US businesses are already on the front lines of the drive to vaccinate America—obviously including pharmaceutical manufacturers and pharmacies, health care delivery systems, and hospitals, but also the shippers that carry the vaccines in specialized cooling containers to states and other destinations across the country; local transit agencies and ride-sharing firms that offer cheap or free rides to vaccination sites; and large meeting venues that have offered their facilities as mass vaccination sites. Not all lines of business are so closely aligned to the core needs of the vaccination process. However, every business can play a role in vaccination, and in fighting the pandemic generally.

Disinformation must be countered by accurate information from trusted sources. Employers can communicate the science about the safety of vaccines, explaining the
trade-off between the inevitable but small risk and the substantial benefit. Business leaders can set a constructive example by getting vaccinated, in proper turn. Where practicable and helpful, employees can be given time off to obtain vaccinations. At some point, when vaccine supply becomes adequate, vaccinators and vaccines could even be brought to the workplace. Some employers are paying the cost of transportation to vaccine sites in addition to providing time off for employees to get vaccinated; others are offering cash bonuses to employees who are vaccinated.32

In the broader fight against the pandemic, many businesses can communicate the scientific facts about responsible behavior—wearing masks, maintaining social distancing—both to their employees and to their customers. Respected voices can help offset the din of disinformation that has led to confusion and spreading of the virus.33

**Sound Public Policy**

The nation must focus on vanquishing the SARS-CoV-2 pandemic now. However, we also must prepare to focus, when that struggle is over, on the next pandemic.

The world, in fact, has endured two coronavirus pandemics—before SARS-CoV-2—in the last quarter century, and a third viral pandemic beginning 40 years ago. Severe Acute Respiratory Syndrome (SARS or SARS-CoV, another coronavirus) apparently spread from Asia in 2003.34 Middle East Respiratory Syndrome (MERS or MERS-CoV, yet another coronavirus) was first reported in Saudi Arabia in 2012.35 Human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) were first reported in 1981. HIV killed more than 25 million people. The lethality of MERS was probably over 30 percent. The only saving grace was that these prior viruses were far less transmissible than SARS-CoV-2. If the current coronavirus were to mutate dangerously, or if a subsequent virus were to combine the lethality of MERS with the transmissibility of SARS-CoV-2, the outcome could be too terrible to contemplate. The nation must be prepared to react more quickly and strongly in a future pandemic, as well as be prepared for a possible surge in COVID-19.

**The Strategic National Stockpile, and Personal Protective Equipment.** Immediately and most basically, the nation must rebuild the supplies of Personal Protective Equipment (PPE) in the Strategic National Stockpile (SNS), so that health care professionals can work in the safest possible conditions. But beyond the basics, the federal government must monitor the vaccine delivery system for any bottlenecks that may build. There have been concerns about the supply of pharmaceutical-quality glass, stoppers, and “low-dead-space” syringes (which are sometimes able to extract an extra dose of vaccine from a vial36). The supply of dry ice, as another example, became critical when the requirement for supercooling of the Pfizer vaccine during shipping and storage suddenly became apparent.37

Health care institutions (which may be private or public) can be expected to exert their own demand for such supplies, which can in turn be expected to elicit more supply. However, with the public health at risk, and the danger that awareness of the need may lag, and that market forces and competitive bidding among health care institutions can cause short-term price spikes, there can be a role for the federal government to play.
Rebuilding the SNS is essential. Its inventory is much broader than just PPE, and the nation’s needs must be analyzed carefully to determine what products, components, drugs, raw materials, and so on are needed for response in an emergency. For example, the SNS should be prepared for viral as well as bacteriological outbreaks (before the current pandemic, it was much more the latter); such commodities as pharmaceutical-quality glass and sophisticated syringes will almost certainly need to be included. All of these commodities must be monitored and renewed as they exceed their useful lives.

There must be global cooperation and coordination with our allies; in a crisis, nations must not retreat to nationalistic impulses. When the current crisis is over, the federal government should fill the SNS with quality supplies at low prices from wherever in the world they can be obtained. However, given the contingency that a global pandemic likely would break global supply chains (because manufacturing plants could be closed, or because supplies would be needed elsewhere and could even be reserved by producing countries for their own use), the United States should build and maintain supply chains with clarity, openness, and redundancy. Production capacity must be available, even if on a standby basis, for global emergencies. That will entail a cost, which should be borne by the public.

**Vaccines.** The supply of vaccine itself in the near term is critical, and tenuous. Manufacturing vaccines has never been simple, and making these vaccines with new technology and at unheard-of scale has already proved testing. The federal government played a role early on through “Operation Warp Speed,” which took an end-to-end perspective on the vaccine-development process and sought to squeeze out any dead time that was not necessary for safety or efficacy. Most critically, the federal government absorbed the financial risk of the production of some vaccines before they were approved for emergency use, so that substantial stocks would be available for shipment immediately upon approval. That part of the process was successful, though not totally up to expectations, and it was not exploited to the extent that it could have been with more purchases.

At this point, the timeline indicates that there will be sufficient vaccine doses to inoculate the entire US adult population by the end of May. However, that cannot be taken as the finish line. Production may need to continue beyond the roughly 600 million doses that should be available by the end of May, and additional research may be needed to modify the vaccines to address the new variants as well.

The experience of the current pandemic suggests strongly that the United States should build and maintain standby production capacity for the vaccines that will need to be deployed in a future pandemic (because with current technology, vaccines must be created for particular viruses, and so cannot be stockpiled). Such capacity is indirectly analogous to the SNS, as it is to past and existing stockpiles of helium (the National Helium Reserve, for lighter-than-air aircraft) and petroleum (the Strategic Petroleum Reserve, or SPR)—that is, for supplies or commodities that are considered of strategic importance but that can be physically stockpiled. However, upon reflection, standby vaccine production capacity might be more directly analogous to the national defense establishment as a whole. We created and we maintain national security capacity at considerable expense in the hope that it will not be needed, but in the certainty that it could not be built quickly enough if a contingency should arise. The same would be true of a standby antiviral vaccine production capacity.
Any such production facilities would need to be built and maintained in cooperation and coordination with the private sector. Ideally, such facilities would not alter the capacity or the behavior of the pharmaceutical industry; in no way should the existence of standby capacity suggest to private firms that they should reduce their own, lest the entire purpose of the emergency preparation be defeated. Nor should the availability of the capacity advantage any one producer against another. The model of the neutrality of the SPR should be useful.

**Conclusion**

Both business and the public sector can contribute to the battle against the current pandemic. Business can provide targeted commodities (such as masks) and services (such as transportation to vaccination sites). And business can contribute to the struggle against disinformation so that people choose to wear the masks, and to receive the inoculations. The public sector must improve its information collection and reporting, so that vaccines reach the right locations at the right times, and it must rebuild adequate stockpiles of PPE and other materials and supplies. But the roadblock to success against the virus today is inadequate supply of vaccines. In the near term, success appears close. But for the next pandemic—which could well be far worse, and may not be far away—the nation must be prepared to supply sufficient vaccines once they are developed, much more rapidly than has occurred in this episode. That will require public initiative, in cooperation with the private sector. This is a necessary national security expense—which we all should hope will prove unneeded in the end.
Endnotes

1 The typical time for a vaccine development program has been about 10 years, with the quickest development the four years it took to make the mumps vaccine, licensed in 1967. See Jared S. Hopkins, “How Pfizer Delivered a COVID Vaccine in Record Time: Crazy Deadlines, a Pushy CEO,” Wall Street Journal, December 11, 2020.


14 “Public Satisfied with Vaccine Rollout, But 1 in 4 Still Unwilling to Get It,” Monmouth University Polling Institute, March 8, 2021.


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Budget for America’s Future, p. 403.
SUSTAINING CAPITALISM

Achieving prosperity for all Americans could not be more urgent. Although the United States remains the most prosperous nation on earth, millions of our citizens are losing faith in the American dream of upward mobility, and in American-style capitalism itself. This crisis of confidence has widened the divide afflicting American politics and cries out for reasoned solutions in the nation’s interest to provide prosperity for all Americans and make capitalism sustainable for generations to come. In 1942, the founders of the Committee for Economic Development (CED), our nation’s leading CEOs, took on the immense challenge of creating a rules-based postwar economic order. Their leadership and selfless efforts helped give the United States and the world the Marshall Plan, the Bretton Woods Agreement, and the Employment Act of 1946. The challenges to our economic principles and democratic institutions now are equally important. So, in the spirit of its founding, CED, the public policy center of The Conference Board, will release a series of 2021 Solutions Briefs. These briefs will address today’s critical issues, including health care, the future of work, education, technology and innovation, regulation, China and trade, infrastructure, inequality, and taxation.