

Public and Social Sector Practice

# The COVID-19 vaccines are here: What comes next?

Countries must prepare now for the largest simultaneous global public-health initiative ever undertaken.

*This article was a collaborative effort by Gaurav Agrawal, Nawaz Ahmad, Tania Holt, Brindan Suresh, and Lieven Van der Veken.*



**Coronavirus vaccines** have started becoming available in some countries<sup>1</sup> and are expected to be critical tools in ending the pandemic. Several vaccines in development have reported promising initial data, with some receiving authorization for use.<sup>2</sup>

Now the focus is likely to shift to how quickly and successfully vaccines can be distributed, an effort that will be the largest simultaneous global public-health initiative ever undertaken. The scale of the challenge is immense: from the sheer volume of doses needed to planning for uncertainties around the vaccines' safety, efficacy, and durability—and from logistical and storage challenges to the service-delivery model. Governments will likely be expected to mount communication and education campaigns to address the concerns that consumers have about vaccine safety. In particular, without proactive planning, underserved populations disproportionately affected by COVID-19—including ethnic, minority, and socioeconomically deprived groups, as well as rural populations—may face disparities in vaccine adoption.

Citizens will look to national and regional governments for a delivery plan. As vaccine availability nears, communities and consumers will want answers to many questions, including:

- Is the vaccine effective and safe?
- Who will get vaccinated first?
- Which vaccine will we receive, especially if multiple vaccines are available?
- Where and when can we get vaccinated?
- Will we have to pay?
- Above all, what do we need to worry about?

Unfortunately, many countries are not yet ready to respond to these questions and are underprepared for the scale of the delivery challenge. In response, they could pursue a structured program that we call the 6A framework, an approach that accelerates end-to-end planning to ensure vaccines are

available, administrable, accessible, acceptable, affordable, and accountable. Countries can take near-term actions to speed their efforts, such as setting up or strengthening vaccine task forces; developing a delivery road map and agreed-upon governance; and starting no-regrets activities such as supply-chain logistics planning, administration-site selection, and service-delivery model planning. Done correctly, vaccine delivery efforts can save lives and restore livelihoods, strengthen public trust in governments, and allow us to start the next normal.

## **The COVID-19 vaccine delivery challenge**

The outstanding progress made by the scientific community has brought the vaccine closer to our doorstep. The baton now passes from the scientific community to a new collaborative effort, led by government and policy makers, healthcare professionals, the private sector, and other community groups. The COVID-19 vaccine rollout will be unlike any other prior vaccine delivery effort. Governments and their partners will be expected to rapidly accelerate their efforts to ensure they are able to address community expectations.

Multiple factors will make the rollout of a COVID-19 vaccine more complex than any other previous vaccine effort.

### **Accelerated pace and giant scale of delivery**

Countries face a four-by-four challenge: a vaccine arriving at four times the pace and requiring delivery at four times the scale.

***Four times the pace.*** The coronavirus vaccine has been developed four times faster than the mumps vaccine, which was the previous record for a vaccine developed for use in a widespread community setting. The consequence of this pace of clinical development is that governments and policy makers have had far less time than previously to prepare for a robust vaccination program.

***Four times the scale.*** The COVID-19 vaccine rollout is expected to be four times larger than any previous effort because the aspiration is for broad adoption at significantly higher rates than typically

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<sup>1</sup> "COVID-19 vaccine: First person receives Pfizer jab in UK," BBC News, December 8, 2020.

<sup>2</sup> "UK authorizes Pfizer/BioNTech COVID-19 vaccine," Gov.UK, December 2, 2020.

achieved with seasonal adult vaccines, such as the flu. Compared with the flu, for which roughly half the adult population across the OECD is covered each year with a single dose, the COVID-19 situation may require vaccinating more than half the adult population with two doses. Globally, that means billions of people could seek the vaccine.

#### **Countries must plan amid uncertainty**

Vaccine rollouts are normally planned with a known vaccine for a known population. COVID-19 is different. Country officials must become comfortable planning amid uncertainty, developing scenarios, and aligning on a set of standardized assumptions. Although the range of uncertainty is narrowing, questions remain about which vaccine countries will receive, when, and in what quantities. The clinical profile (safety, efficacy, and durability) of each vaccine, outside of the study context, will also become better known over time, along with a number of non-vaccine-related factors, such as how the epidemiology of the pandemic evolves. But the uncertainty is likely to persist as additional vaccines with potentially more attractive features (for example, thermostability and a single-dose requirement) are developed.

#### **The standard sequential-planning approach may be ill-suited for COVID-19 vaccines**

Dependencies in vaccine rollouts typically lead to sequential planning. For example, cold-chain requirements typically influence the delivery strategy—many smaller mobile delivery centers versus fewer large, fixed centers. For the coronavirus vaccine, however, many critical steps could limit delivery scale-up. Coupled with tight delivery timelines, this means countries could consider thinking about end-to-end planning now; they cannot work from one step to the next. Planning can happen in parallel, with potential revisions made as assumptions change or uncertainties clear up (Exhibit 1).

#### **Countries may have to plan for multiple vaccines from different manufacturers**

The vaccines may have different technical and product characteristics (for example, viral vector versus mRNA). Vaccines may also have different

transport and storage requirements, administration protocols, and real or perceived differences in safety and efficacy, with one vaccine potentially being more effective in a given subpopulation than another.

#### **Planning will need to account for a dynamic and evolving service-delivery model**

The service-delivery model for the vaccine will likely look different over time. In the first phase, there will probably be limited amounts of vaccine available, federal or public control of supply, and delivery to a prioritized population. This approach may well change as data and supply volumes increase. Vaccines would need to be made widely available with consumer convenience in mind, a critical factor during adult vaccination seasons, such as for seasonal flu.

#### **Vaccines will require various cold-chain approaches**

Countries receiving certain types of vaccines (for example, some mRNA vaccines) will have to plan for ultra-cold-chain transport and storage at negative 70 degrees Celsius. Existing vaccines do not typically require an ultra-cold chain, so many countries will need to develop their ultra-cold-chain infrastructure to use such products. This will be a particular issue for less economically developed countries and those with large, geographically remote, and rural populations.

Delivering a vaccine in the face of these challenges will require collaboration and coordination at all levels of government—in particular, across national and subnational structures in decentralized healthcare systems—and among the public, private, and nonprofit sectors. To ensure accountability and acceptable governance, specific guidance and expectations should be spelled out.

In addition, a healthcare workforce will need to be redeployed and, in some cases, recruited and trained, with some countries likely drawing on retired health professionals.<sup>3</sup> A data-monitoring and -tracking system of unprecedented scale is likely needed to ensure safety and proper follow-up for two-dose vaccinations.

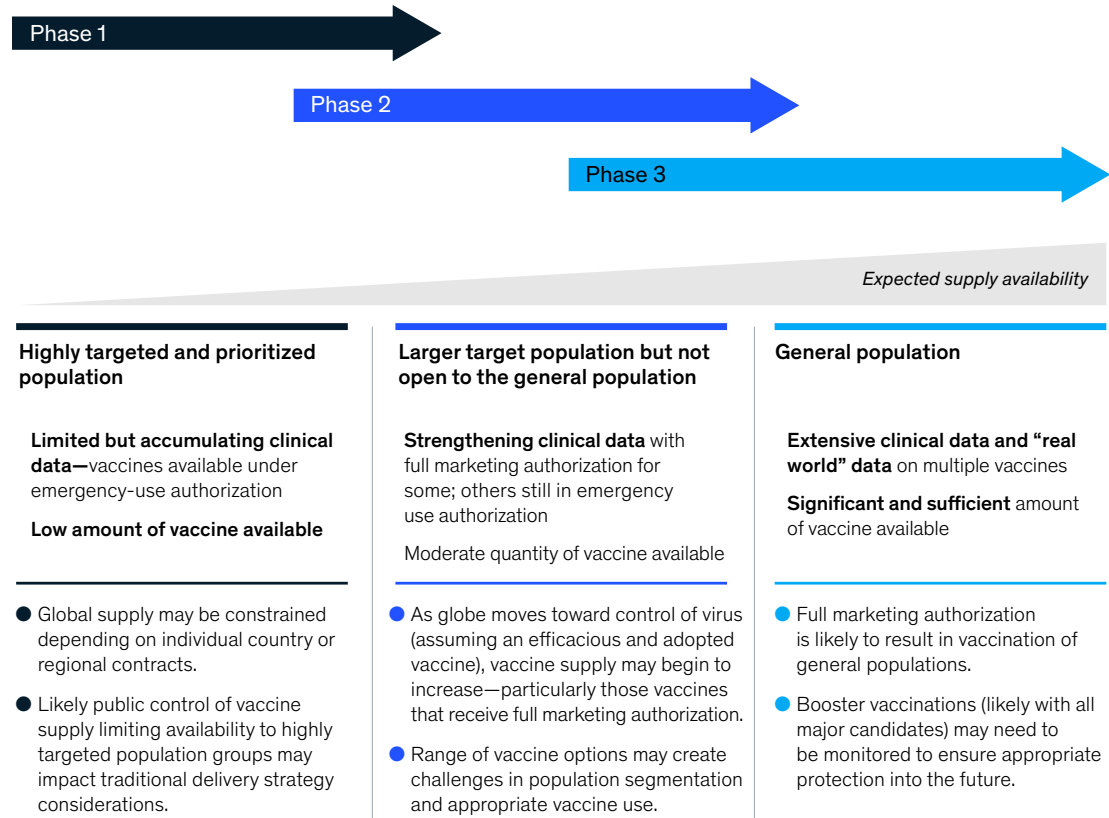
Finally, governments should not underestimate the challenge of consumer skepticism; this must be addressed to instill the public confidence required

<sup>3</sup> Denis Campbell, "NHS assembles army of staff for mass coronavirus vaccinations," *Guardian*, November 19, 2020, [theguardian.com](https://www.theguardian.com).

## Exhibit 1

# Vaccine immunization strategy will evolve and require dynamic planning.

## Vaccine approval timeline



Source: “COVID-19 Tracker,” Milken Institute, updated March 18, 2020, [milkeninstitute.org](https://milkeninstitute.org); [clinicaltrials.gov](https://clinicaltrials.gov), BioCentury.

for successful adoption of vaccines. Countries may consider investing in public communication, messaging, and education to ensure that their citizens choose to receive the vaccine. At the same time, they must account for the personal choice of citizens regarding vaccines with emergency-use authorizations and limited long-term safety data. It will not be a straightforward task due to diverse and changing population sentiment, variable trust in public health communications, fragmented news and media ecosystems, “messaging fatigue,” and persistent dis- and misinformation—alongside the shortage of long-term safety data that is typically available when launching a vaccination for the general public. Most countries polled in a World

Economic Forum/Ipsos poll in August 2020 and October 2020 showed a decrease in respondents who said they would take a COVID-19 vaccine,<sup>4</sup> illustrating the scale of the challenge. The recent promising trials of vaccines in several countries may influence public opinion in the opposite direction.

## Now what? Countries need to move fast

Most countries are underprepared for the scale of the delivery challenge. Many have not approved sufficient funding specifically for delivery, and only a minority have published a vaccine strategy or assembled a vaccine delivery task force.

<sup>4</sup> Gayle Markovitz and Amanda Russo, “Survey Shows Rising Vaccine Hesitancy Threatening COVID-19 Recovery,” World Economic Forum, November 5, 2020, [weforum.org](https://www.weforum.org).

Although the scale of the task may seem daunting, countries benefit by starting end-to-end planning immediately. Our 6A framework lays out a structured approach to ensure vaccines are available, administrable, accessible, acceptable, affordable, and accountable while taking into account strategic considerations associated with uncertainty (for example, vaccine clinical and technical profile) and building system capabilities (Exhibit 2). We have developed, in granular detail, the individual activities and considerations behind each component of the framework. Through the collective initial effort of the pharma industry, the scientific community, global health institutions, and governments, most elements of the “available” segment of the 6A journey are being addressed.

An effective strategy will need to address each component of the 6A framework for vaccine adoption. However, countries are in different starting positions, and some components will

present bigger challenges than others. For example, public skepticism of vaccines is higher in some countries, while other countries have plans developed for recent epidemics that they can use.

All of these components are important in mounting a successful effort, but countries should take four no-regret actions now to begin or accelerate their planning.

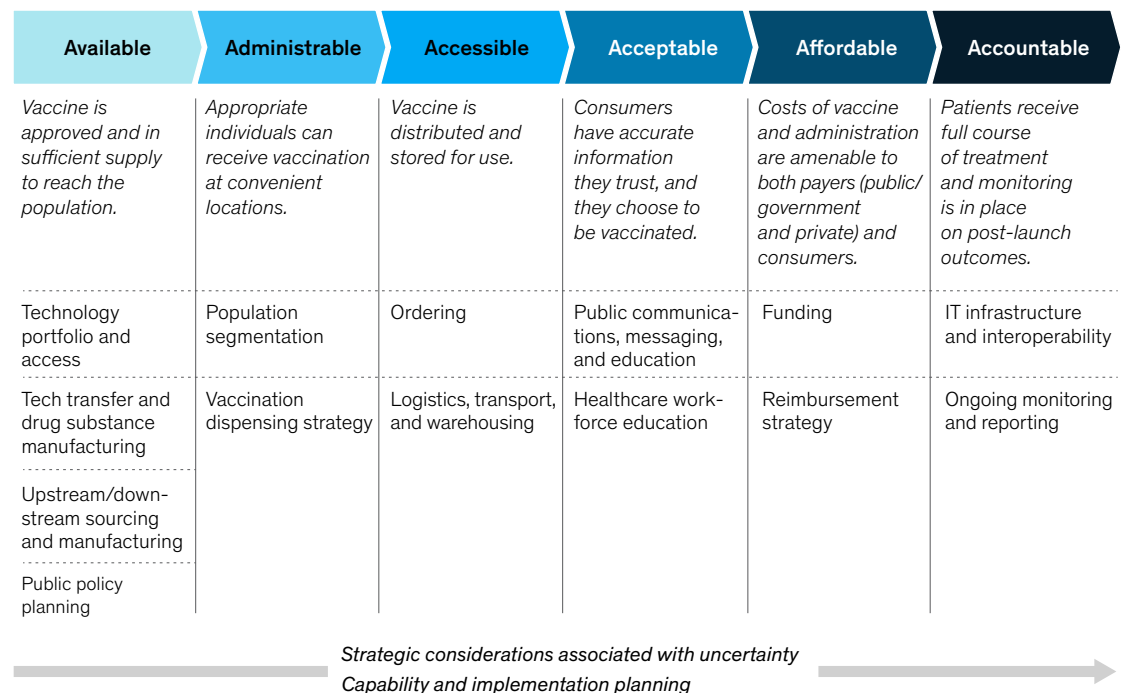
### Set up or strengthen a vaccine task force

To be effective, a vaccine task force must have the right structure, people, and processes to coordinate and manage progress of activities for all key players across the public and private sectors and different government levels. The task force needs a comprehensive overview of system readiness from port to consumers so that it can prioritize and manage risks on a regular basis. As a result, the task force will need access to real-time, accurate information to make data-driven decisions (Exhibit 3).

Exhibit 2

## An effective COVID-19 immunization strategy addresses each component of vaccine adoption.

### Key activities of vaccine adoption



## Develop scenarios to inform the vaccination strategy

Countries will need to get comfortable with planning amid uncertainty and align on a set of standardized assumptions that can be used consistently across all parts of the system. Leaders should also decide on a process for revising assumptions when new information (such as safety data or new efficacy results) becomes available.

## Apply the 6A framework and a set of granular activities to codevelop an iterative road map and agreed governance

The vaccine task force should convene a broad set of national, regional, and local stakeholders to develop a delivery road map. This exercise can be used to ensure clarity on governance, accountability, and decision making across all stakeholders and lay out a clear path forward.

## Begin executing against the road map

Along with the early identification and triggering of no-regrets activities, countries should be prepared to address several elements in the road map.

*The complexity of end-to-end integrated supply-chain logistics.* Most of the existing global vaccine supply chains focus on chilled vaccines. An ultra-cold chain needs to be established and coordinated with other supply chains, such as personal protective equipment for health workers and other consumables (see sidebar, “Managing the cold chain”). In addition, countries will need to make early decisions on third-party versus in-house logistics providers.

## Site selection and service-delivery model.

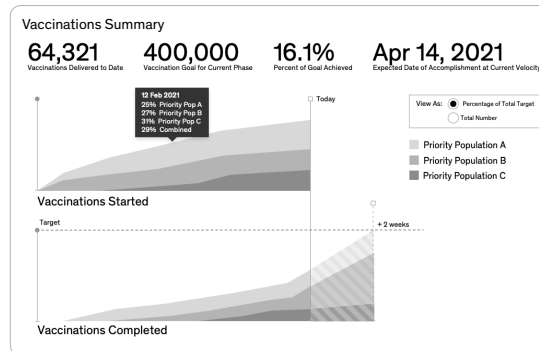
Site selection will need to balance cold-chain constraints with population coverage and

### Exhibit 3

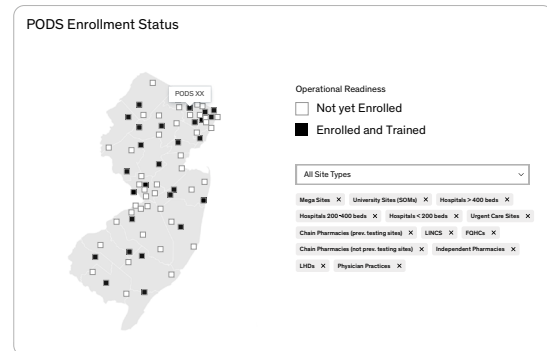
## A successful COVID-19 vaccine rollout requires leaders to have at-a-glance key metrics and accurate implementation data.

### Example visualization modules from McKinsey Vaccine Implementation Dashboard

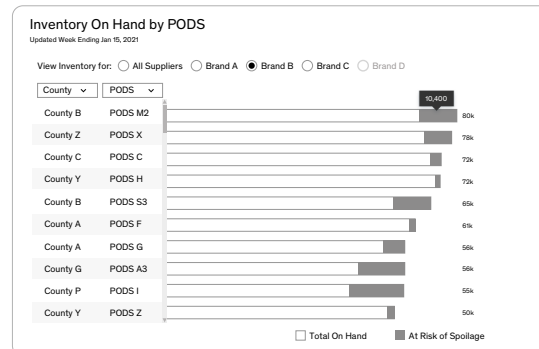
#### Vaccine coverage example



#### Provider readiness example



#### Vaccine management example



#### 1 Vaccine coverage

What is our progress by geography, priority population, and demographic?

#### 2 Provider readiness

What is our overall and regional provider site readiness? Which providers are actually vaccinating?

#### 3 Provider monitoring

Which providers have the lowest throughput? What is the current inventory per site?

#### 4 Vaccine management

What are our levels of vaccine supply? Which brands are experiencing adverse events and at what rate?

#### 5 Consumer journey

What friction exists in the journey to vaccination? Where do we need to increase public information campaigns?

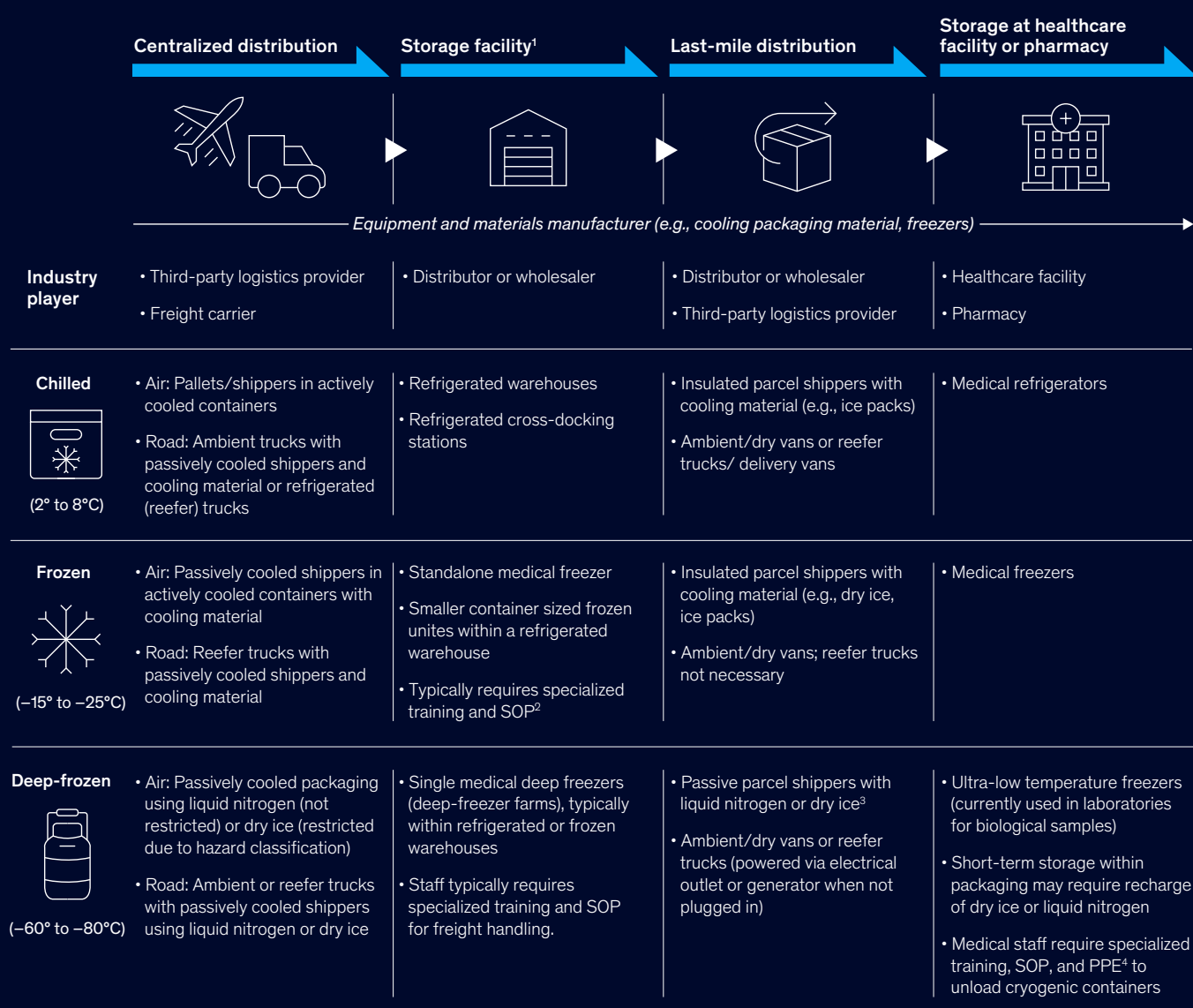
#### 6 Compliance

Are we adhering to any federal or centralized reporting requirements?

# Managing the cold chain

Vaccine production, including packaging and labeling, is the start of the value chain. The different requirements of each vaccine present a formidable challenge across the rest of the value chain. Vaccine candidates fall into three categories of cold-chain requirements: chilled (2° to 8°C), frozen (–15° to –25°C), and deep frozen (–60° to –80°C). The latter two categories accounted for just 1 percent of the vaccine distribution before COVID-19, meaning that countries will have to invest in infrastructure across the value chain.

Players in the cold-chain industry have largely standardized procedures and technologies for chilled and frozen pharma distribution, but deep-frozen requirements are rare.



<sup>1</sup>Industry trend is to ship directly from manufacturer to healthcare facility, bypassing storage in a distributor's or wholesaler's warehouse.

<sup>2</sup>SOP = standard operating procedure.

<sup>3</sup>Liquid nitrogen shippers can hold shipment up to 10 days vs 3-4 days for dry ice, making reefer trucks potentially unnecessary.

<sup>4</sup>PPE = personal protective equipment.



workforce considerations. Some countries are using geospatial analysis to optimize site selection. Individual sites could employ a service-delivery model that minimizes disease transmission risk and includes data and monitoring capabilities to ensure supply and demand of vaccines is always in balance. Further, the delivery model and vaccination sites may need to adapt as countries move from limited-availability, high-risk immunization to wide-availability immunization.

***Healthcare-worker training for vaccine administration.***

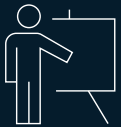


The ultra-cold chain requirement of some of the early vaccines, coupled with the potential need for new vaccination sites (whether to reach the high-risk elderly population or to enhance convenience for consumers), could increase the burden on healthcare staff for vaccine handling (for example, storing, thawing, and handling multidose vials at

the site). These tasks will require staff training and education to ensure safe and effective vaccines are administered to the public.

***Gaps in consumer education.*** Countries will need to carefully deploy targeted vaccine education tools and insights to help consumers make more-informed choices to protect themselves and their family members—especially among vulnerable communities (Exhibit 4). Similar efforts would be needed to reduce the potential drop-off between first and second vaccine doses. Country or state governments could take several actions to increase the effectiveness of vaccination rollouts. First, they should understand the barriers to adoption and deep-seated beliefs in a microsegmented way (for example, through tools such as active media listening, attitudinal surveys, and quantified experience-design tools,

Exhibit 4

**Addressing gaps in vaccine willingness can maximize access in vulnerable communities.**

Focus area	Example interventions
 <p>Understanding</p>	<ul style="list-style-type: none"> <li>● Ensure stakeholders are aware of different levels of trust in some vulnerable communities.</li> <li>● Reconcile current consumer concerns about a forthcoming COVID-19 vaccine.</li> </ul>
 <p>Access</p>	<ul style="list-style-type: none"> <li>● Work with leaders of communities most in need to ensure that vaccine distribution is perceived to be fair, collaborative, and equitable.</li> <li>● Simplify process (documentation, waiting times) and criteria to receive vaccine.</li> <li>● Provide community-based administration setting.</li> <li>● Provide small incentives for timely compliance.</li> <li>● Offer free or cost-reduced transportation.</li> </ul>
 <p>Communication</p>	<ul style="list-style-type: none"> <li>● Use understanding of perceptions and attitudes on a microsegment level to set expectations and build trustworthiness with vulnerable communities.</li> <li>● Enlist trusted validators and influencers (e.g., minority physicians, religious leaders, community leaders, influencers) to become active allies and advocates.</li> <li>● Develop target-language campaigns and resources as needed and share messaging in person and across channels.</li> </ul>



such as ethnographic journey mapping). Second, stakeholders could develop clear communication and messages that offer fact-based information while contextualizing early vaccine data to help consumers make informed decisions. Last, a widespread multichannel approach could be used to disseminate national, state, and local messages, including hyperlocal approaches, such as engaging community influencers through social media.

One of the most consequential scientific quests of our lifetime—the development of a safe and effective vaccine against SARS-CoV-2—is starting to yield highly positive initial outcomes. While much work remains to establish long-term safety and duration of immunity, the likely end to the pandemic

rests, more squarely than ever, on the shoulders of local, state, national, and global authorities that will need to mount the largest public-health intervention ever attempted. Vaccine rollout will have to happen at an unprecedented speed and scale, including the development of plans under extreme uncertainty to handle unprecedented cold-chain logistics and build societal trust and consumer confidence.

This task could hardly be more daunting. But countries that meticulously plan and execute will see the long-lasting benefits on lives and livelihoods. The preparedness framework and immediate actions described above provide a starting point for this journey.

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