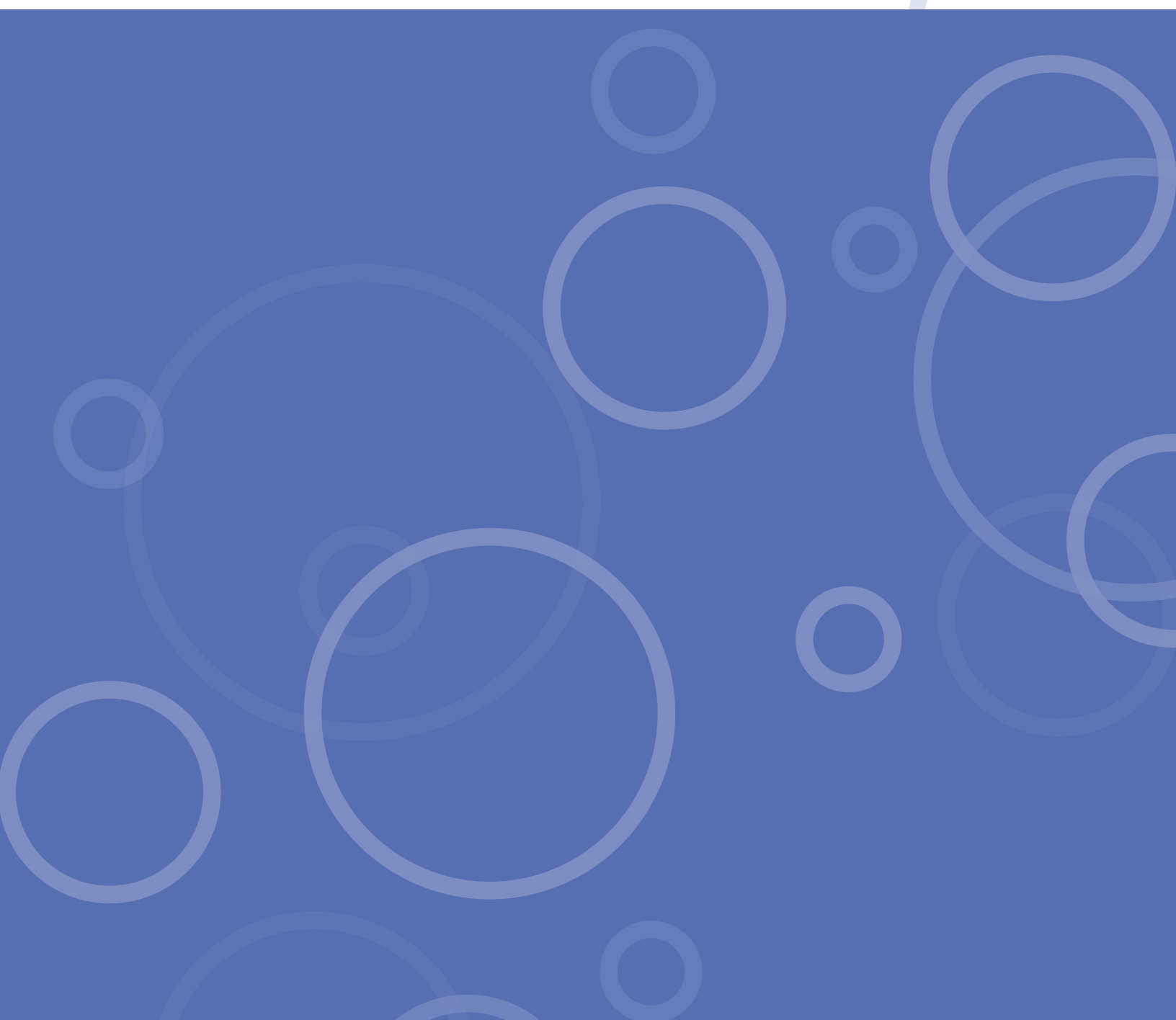


# **Modern Vaccine Management: What Leaders Need to Know**



## Who should read this white paper

**Public Sector leaders:** directors, commissioners, and state and local chief innovation officers.

**Healthcare and Life sciences leaders:** deputy commissioners, communications, finance, HR, facilities management directors, chief epidemiologists, COVID-19 leads at public health agencies or departments of health involved with vaccine administration, follow-up documentation, and reporting.

## What you will learn

Data-driven visual analytics are foundational for any organization tasked with managing one of the largest mass vaccination campaigns in history. In this white paper, you will see real-world solutions and find out how lessons learned today can help inform data strategy through the current pandemic and beyond.

# Contents

Introduction ..... 4

**CHAPTER ONE**

Challenge at scale ..... 7

**CHAPTER TWO**

What does modern vaccination management look like? ..... 12

**CHAPTER THREE**

Real-world solutions ..... 14

    Vaccine Performance Management Dashboard ..... 14

    Vaccine Priority Management Dashboard ..... 15

    Facility Search Dashboard ..... 16

    Inventory Management Dashboard ..... 17

    Adverse Reactions Surveillance Dashboard ..... 18

Conclusion ..... 20

Related resources ..... 20

About Tableau ..... 20

## Introduction



The influenza pandemic that erupted in 1918 was the first great collision between nature and modern science. It was the first great collision between a natural force and a society that included individuals who refused either to submit to that force or to simply call upon divine intervention to save themselves from it, individuals who instead were determined to confront this force directly, with a developing technology and with their minds.”

— JOHN M. BARRY, *THE GREAT INFLUENZA:  
THE STORY OF THE DEADLIEST PANDEMIC IN HISTORY*

The Spanish Flu pandemic of 1918–19 taught us the importance of applying science as an antidote to panic, disinformation, and fear—and it also proved to be a cautionary tale that illustrated the dangers of inadequate planning and lack of coordination. **These lessons are still relevant today.** In 2020, we were once again in the throes of a global pandemic, and the world was reminded that building an effective response is as much an art as it is a science, a test of grit and perseverance that will require all sectors of society to play their part.

In 2021, vaccine distribution and vaccination management represent the next phase of the pandemic, where data analytics will play a central role helping us understand the efficacy of our efforts towards achieving herd immunity. From laboratory scientists developing vaccines and the front-line administrators of the vaccination process itself, to public health communications officers educating the public, there are many touch points and critical inputs necessary to successfully stop the spread of COVID-19.

Significantly for organizations who are charged with managing COVID-19 response—including vaccination efforts—the pandemic has been a forcing function for leaders who realize they must continue their digital transformations if they hope to stay ahead of this ever-evolving crisis.

## **A closer look at crisis-driven digital transformation**

While the virus spread exponentially around the world, so did the demand for data. Organizations that were lagging in their digital transformation journeys realized that **accelerating the process was essential for survival**—and it became clear that access to data, and enabling robust **data analytics is synonymous with the ability to make informed decisions**.

In the public sector, COVID-19 made it clear that digital transformation includes data strategy. A modern data strategy, at minimum, recognizes the primacy of data for achieving mission objectives, and is centered on making data easier to access and use for internal and external stakeholders. Building an IT infrastructure capable of handling **surges in demand**, eliminating **data silos**, and **digitizing paper records** are all necessary components of a strong data strategy. Needless to say, serving constituents in a COVID-19 world is a work-in-progress for public agencies at all levels.

### **According to Deloitte, COVID-19 has taught government **seven key lessons** about data strategy:**

1. Real-time data is key to resilience
2. Data presentation is most effective when it's centered on users
3. Cloud converts data from a luxury to a utility
4. Data governance is crucial
5. A data strategy is incomplete without privacy and security
6. Data-sharing enables innovation
7. Identifying and addressing data issues can strengthen decision-making

Governments are also learning that technology and process are only parts of the transformation equation. Because digital transformation requires an equally robust cultural transformation, organizations need to adopt a data mindset—what we call **Data Culture**. Data Culture helps organizations drive the maximum amount of value from their data, and at the same time, empowers their people to do more with data.

This transformation, even when accelerated by crisis, does not happen overnight. “Data-driven business transformation is a long-term process that requires patience and fortitude,” according to the [Harvard Business Review](#). “Investments in data governance, data literacy, programs that build awareness of the value and impact of data within an organization, may represent an eventual step in the right direction, but organizations must show that they are in it for the long haul and stick with these investments and not lose patience or abandon efforts when results are not immediately forthcoming.”



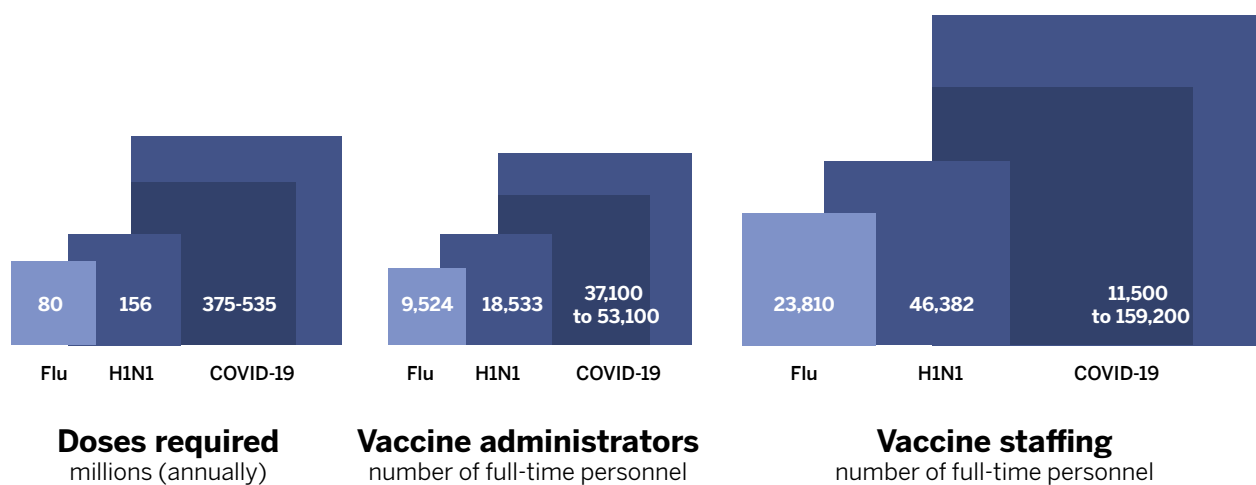
## CHAPTER ONE

# Challenge at Scale



In the United States and other countries with sufficient vaccine quantities and adoption, herd immunity by October 2021 is conceivable, but for that to happen, more than twice as many doses of COVID-19 vaccines will have to be administered each month as were administered during the 2009 H1N1 flu vaccine drive.”

— MCKINSEY & COMPANY



To reach COVID-19 herd immunity, the United States will have to administer 2.4 to 3.4 times as many vaccine doses as it does during annual flu vaccinations, according to recent McKinsey & Company research.

A [recent article in the Economist](#) referred to it as “the race between infections and injections.” Since the novel coronavirus was first identified in Wuhan, China, in December 2019, scientists around the world have been in a race against time to develop vaccines—and remarkably, less than a year later, science has delivered. However, it’s complicated: with virus variants becoming more prevalent, experts are concerned that vaccination programs won’t be able to keep up, creating further uncertainty about [COVID-19 shifting from a pandemic disease to an endemic](#) with lasting consequences. The urgency to establish comprehensive and efficient vaccine management solutions is acute, and the stakes are high.

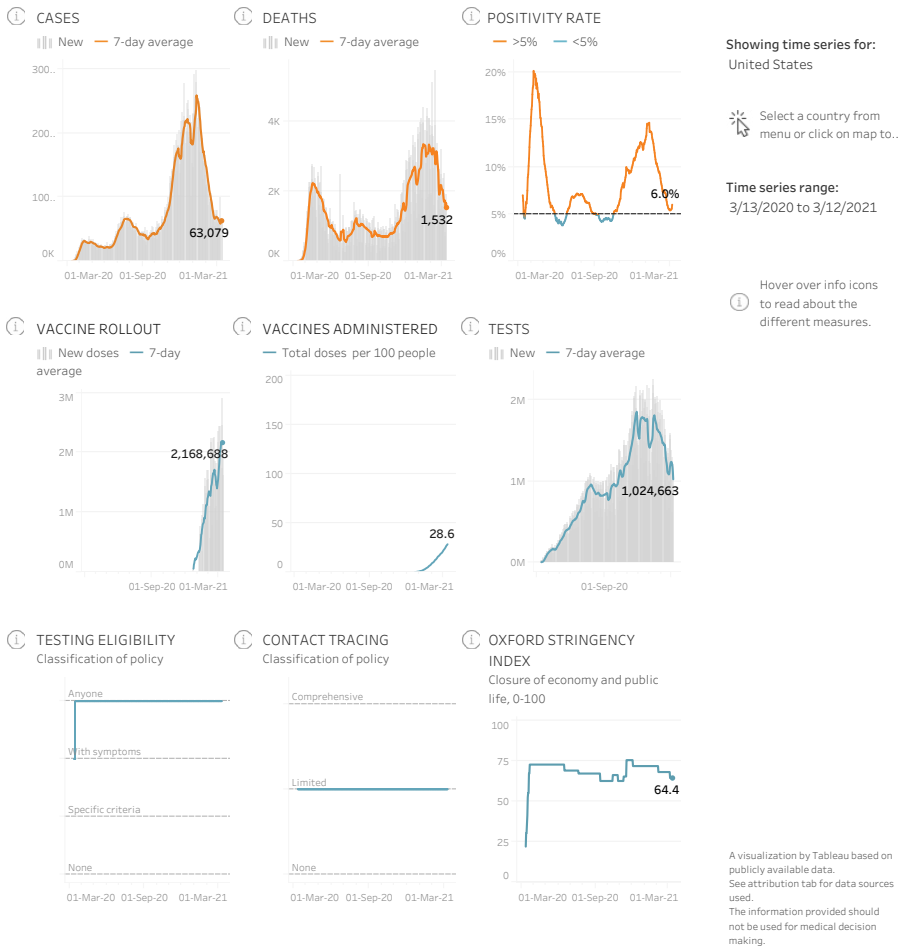
As of early February, 2021, there were close to 70 vaccines in clinical trials, with 20 reaching final stages of testing; six vaccines reported to be in early or limited use, with four approved for full use. Despite this dramatic and historic level of research and development, however, the number of people who need to be vaccinated—is daunting. Further complicating matters is the slow pace of vaccination, and the obvious gaps in comparative vaccination rates in different countries. And in many communities, inefficient data collection and missing data is impeding progress.

**Among the challenges public health officials are facing:**

- Ability to accurately forecast deliveries and ensure supply chain integrity
- Inadequate vaccine supply to meet demand
- Patient prioritization
- Scheduling
- Supply interruptions related to production problems, logistics issues, inefficiencies
- Record-keeping recommended by CDC
- Staffing and human resources coordination at clinic locations
- Adverse reaction monitoring
- Effective public health messaging to combat disinformation, address vaccine hesitancy and improve uptake.



**WHAT IS THE SITUATION IN THE UNITED STATES?**



The **Tableau COVID-19 Data Hub** offers a Global Tracker that allows users to examine key variables from a variety of data sources, providing deeper understanding of the impacts of COVID-19.

Armed with the right data and the right analytics platform, it’s possible to rapidly respond to changing needs on the ground, as the operating tempo changes and new data becomes available. Organizations need the ability to analyze a wide variety of data to monitor progress against goals, and make needed process improvements in near-real time. In the next chapter, we’ll take a look at what that looks like using Tableau.

## A closer look

### Disaggregated data provides insight into vaccine equity



We cannot ensure an equitable vaccination program without data to guide us.”

— MARCELLA NUNEZ-SMITH  
PRESIDENT BIDEN’S COVID-19 EQUITY TASK FORCE CHAIR

As vaccine programs roll out across the United States and around the world, there is increasing focus on **vaccine equity**. How do we ensure that the most vulnerable segments of the population are prioritized? For groups who have been disproportionately impacted by COVID-19—often the same groups who have experienced racism and discrimination in the past—it’s an important question. And from a public health perspective, equitable distribution must be a priority if we are going to make meaningful advances against disease spread. To accomplish this, **we need better, more complete data**.

According to the Kaiser Family Foundation (KFF), people of color are, historically, less likely to be vaccinated, but **only 53% of states** have at least one mention of incorporating racial equity into their targeting plans. Furthermore, KFF notes that **across the 34 states that are reporting race or ethnicity data**, “there is a largely consistent pattern of Black and Hispanic people receiving smaller shares of vaccinations compared to their shares of cases and deaths and compared to their shares of the total population.”

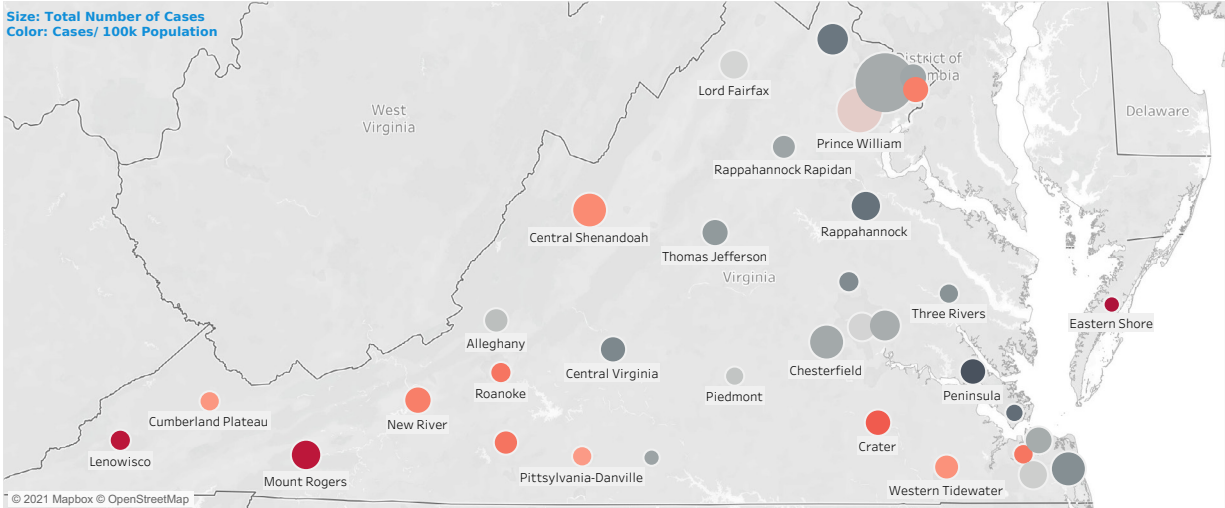
**There is clearly work to be done** to achieve vaccine equity, and much of that work relies on analyzing and understanding and using insights revealed by disaggregated data.

Julia Biedry, Tableau’s Senior Solution Engineer for the UN, has created a variety of dashboards that reveal insights that are only revealed when we look at the data at a granular level. In the dashboard below, COVID-19 cases, hospitalizations, and deaths are disaggregated by race and ethnicity for Virginia Health Districts. Rather than being summed, the metrics are divided into population counts by race and ethnicity to derive cases, hospitalizations, and deaths per 100k population for each racial or ethnic group. According to Julia, “This step is crucial because it reveals the true disparities in COVID-19’s effect on different racial and ethnic groups. For example, at the date represented in the dashboard, the Latino hospitalization rate per 100k was 439, the Black hospitalization rate per 100k was 258, and the White hospitalization rate per 100k was 99, making the Latino and Black hospitalization rates approximately 4x and 2.5x the White rate, respectively.” Interact with the dashboard [here](#).

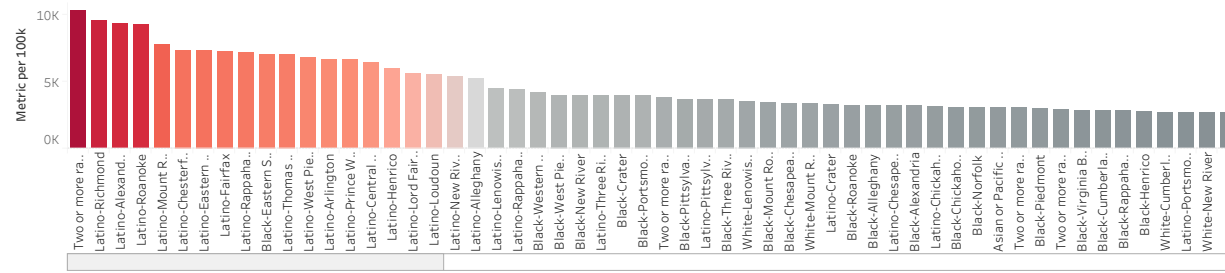
# COVID-19 RACIAL DISPARITIES TASKFORCE - VIRGINIA

## Cases per 100k by Race and Ethnicity

Select Measure Cases				
Latino 5,926	Black 2,745	White 1,624	Asian or Pacific Islander 1,427	Two or more races 1,015



## Worst Incidences - Race Ethnicity and Health District



As this dashboard illustrates, it's only when we explore the data at a disaggregated level that we see the detail we need to understand the broader picture. And when we know to look for the hidden stories in our data, we are acknowledging that every data point is not just a number, but an individual. **Once we can analyze disaggregated data**, and see more precisely what communities are being underserved, we can respond with public health policies and communications outreach that will improve participation and reduce disparities.

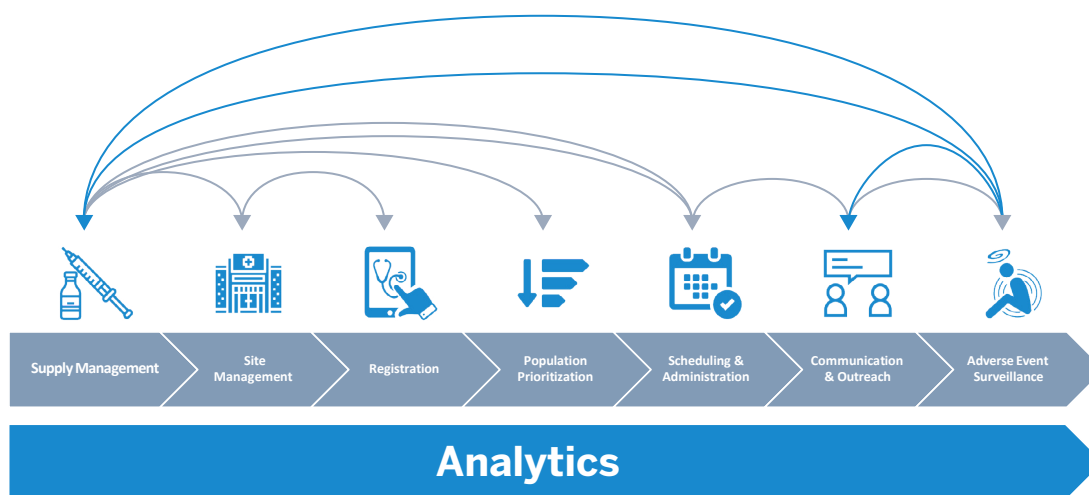
## CHAPTER TWO

### What does modern vaccination management look like?

Vaccine management, according to Dave Kopniske, Tableau Senior Director, Solution Engineering, is “a workflow of highly interrelated processes. Data is collected at every stage, and analytics should be incorporated in all stages, with a focus on process improvement.”

Modern vaccine management bridges a number of disciplines: healthcare, public sector, life sciences, and others. With the width and breadth of data required to gain insight and effectively manage a complex set of processes like a vaccination program, leaders must understand the full spectrum of analyses that are needed, and what a program might look like.

The chart below provides a high-level view of various components of a vaccine management program.



Each of these nine process areas have many already-known analytical use cases that augment the business process flows to provide a data-driven experience for those who are involved in executing the process, those that manage the organization, and those in the general public who need to be made aware of how well (or not) the responsible agency is doing at receiving, managing, and deploying its stock of vaccines from the US Centers for Disease Control and Prevention (CDC) and/or state departments of public health.

## Cultivating a data-first mindset

To succeed with any data initiative (and vaccine management is at its core a data initiative), there needs to be an organizational mindset around the value of data. As we continue to navigate the challenges of COVID-19, there is no better time better to be foundational with data.

Every organization will be impacted directly or indirectly by COVID-19 for the foreseeable future. The best way to position for recovery is to embrace a data-first mindset. Here are three key thoughts to drive you on your analytical journey with vaccine management and beyond.

### Think analytics first

- **Analytics cannot be an afterthought.** Every initiative should have analytics (not reporting) baked in, and it should be part of Phase 1, not later, or when you have time.
- **Every program you have generates data.** Find something to count, and make it count.
- **Think ahead.** Initiatives like this one are loaded with opportunities to use smart visual analytics now for better decisions later.
- **If you do not tell your story with data,** someone else will, and you might not like what they say.

### Be agile

- **Data (and visualizations) will never be perfect.** If you wait to build analytics when you've reached perfection, your opportunity to drive change has passed.
- **Use visual analytics to fail fast.** Get insights to stakeholders and constituents within hours to days, not weeks.
- **Perfect remains the enemy of good.** Good decisions are better than no decisions.

### Build a data culture

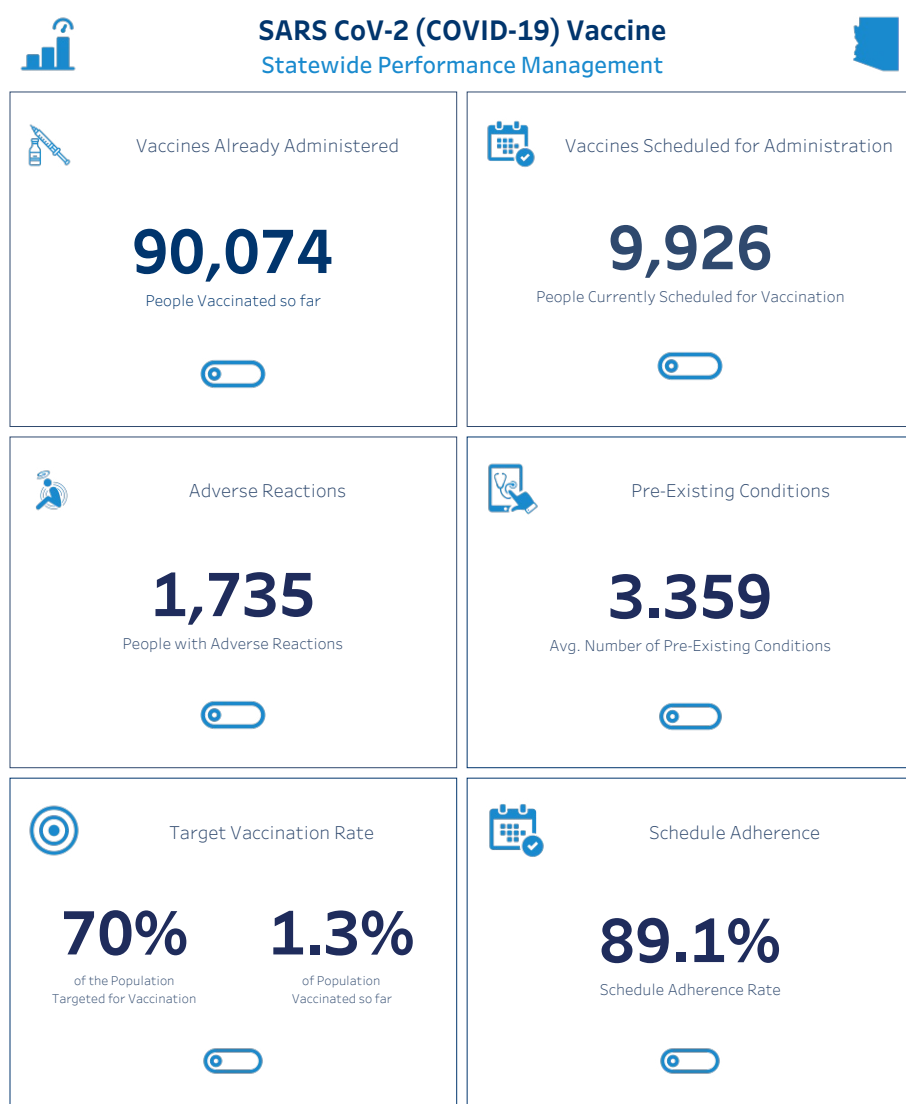
- **Your people are capable.** Give them secure, governed data, and make it available to all to do their job. In a world experiencing rapid change, resilient organizations need their teams to be ready with the right framework to support process and decision making.
- **Analytics is not hard unless you make it that way.** Open mindedness begets data literacy, and data literacy empowers change. Change will be the only constant in the post COVID-19 world.

## CHAPTER THREE

### Real-world solutions

Using Tableau, vaccine management dashboards can be created to analyze a variety of key metrics. Note that these dashboards only utilize demonstration data that do not reflect actual performance data.

#### Vaccine Performance Management



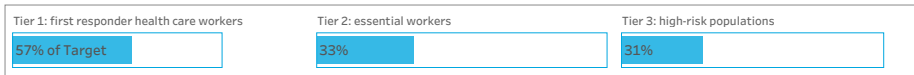
We have all learned that during the COVID-19 pandemic, data means everything. Leadership of states, counties, and cities have been ultimately responsible for conveying the message of how their own locality is doing against the virus locally, and many states have used Tableau to do just that.

The progress against the vaccination targets of each locality is just as important, as there's a goal to vaccinate most of the population and communication is key to driving confidence and participation. Key Metrics, or KPIs, including Adverse Reactions, and Schedule Adherence will be critical as organizations work to deploy vaccines as soon as they are received. Accordingly, a Statewide Performance Management Dashboard like this will be essential to show progress against those targets.

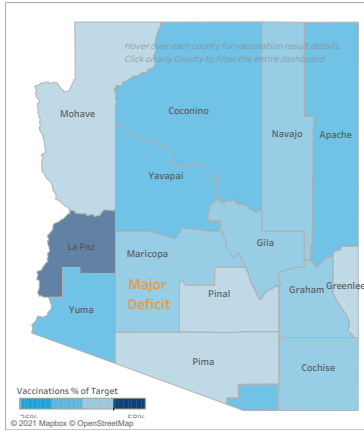
## Vaccine Priority Management

### Arizona | COVID-19 Vaccinated Population % by Priority

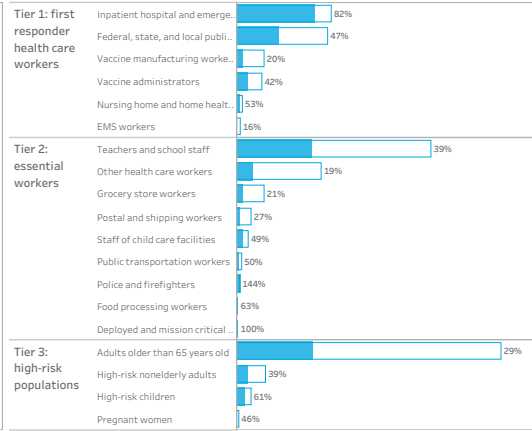
Select Vaccination Date Range: 4/1/2020 to 12/31/2020



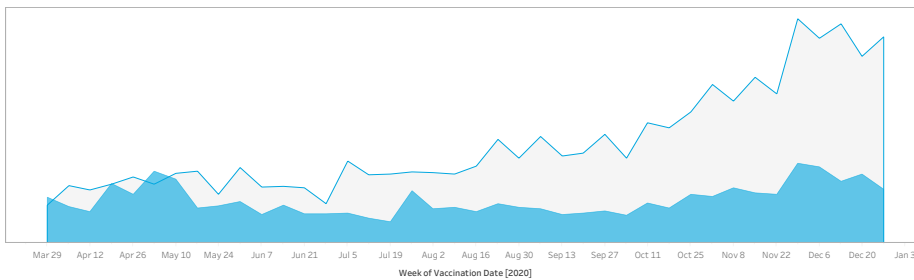
Vaccination % by County



Vaccination % by Priority Groups



Vaccinated Trend: Actual vs Target

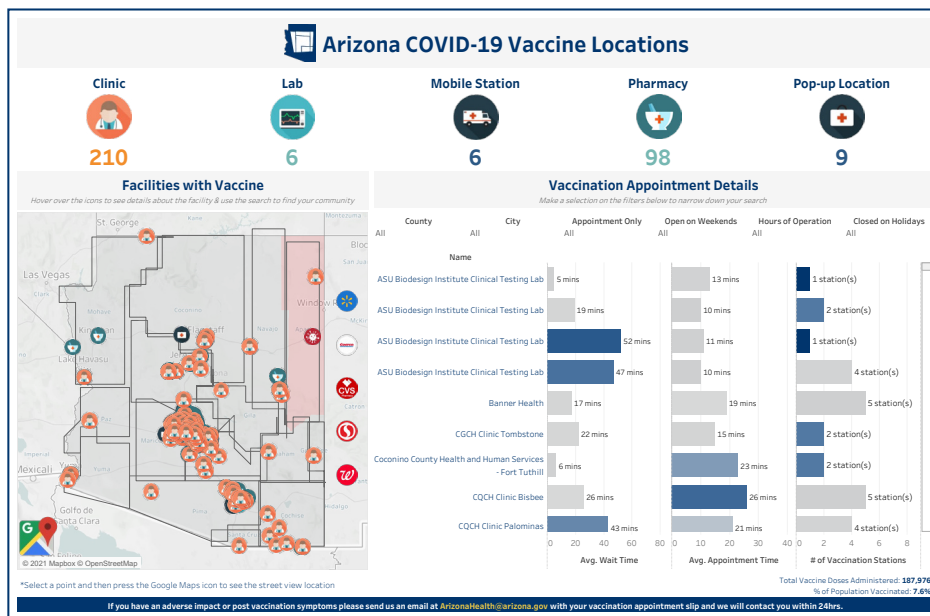


As outlined by the CDC national vaccination prioritization standards and individual state Departments of Health, the population has been segmented into population groups within vaccination tiers for the planning and monitoring of vaccine distribution. Additional dynamic segmentation and identification of sub-priority populations, based on certain occupational or demographic characteristics, will be necessary on an ongoing basis to help identify key co-morbidity indicators, drug-drug interactions and at-risk populations.

Dynamic population segmentation capabilities will allow analysts to quickly refine population tiers by various risk and severity factors ensuring prioritization targets are met given general availability and inventory constraints.

Analysts will be able to view populations by breakouts, such as prioritization tiers and geography, over time to identify where vaccination targets are below defined thresholds. An analyst will be able to hover over a geography and quickly see a contextual summary of vaccinations given, vaccination target and percentage of the vaccination target met for a given sub-population. Color encoding along with quick comparisons of actual to target trends will enable the easy identification of hot spots by risk factors and pre-existing conditions along any tracked demographic such as occupation, age groups, race/ethnicities, gender, et cetera.

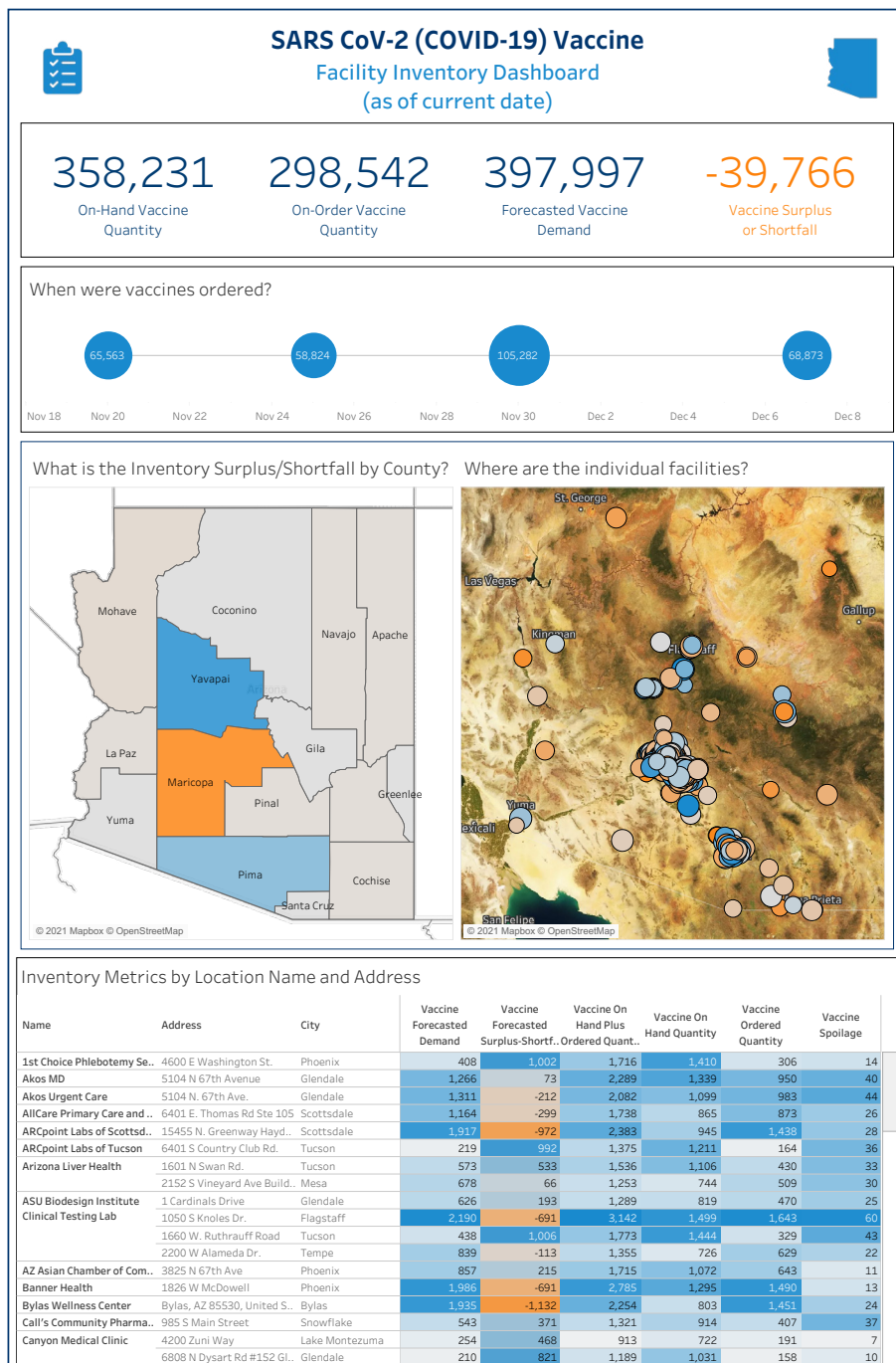
## Facility Search



At the point where vaccination registration begins, we can expose the registration application built in Salesforce to the community. Key to that experience is the Facility Search Dashboard. The audience for this dashboard is the general public. They will engage with the site data to understand where the sites/ locations are that are most convenient to them and their personal situation. Just like you want to put your most important view in the upper left of your dashboard, you want the most important elements of your tooltip to be at the top.



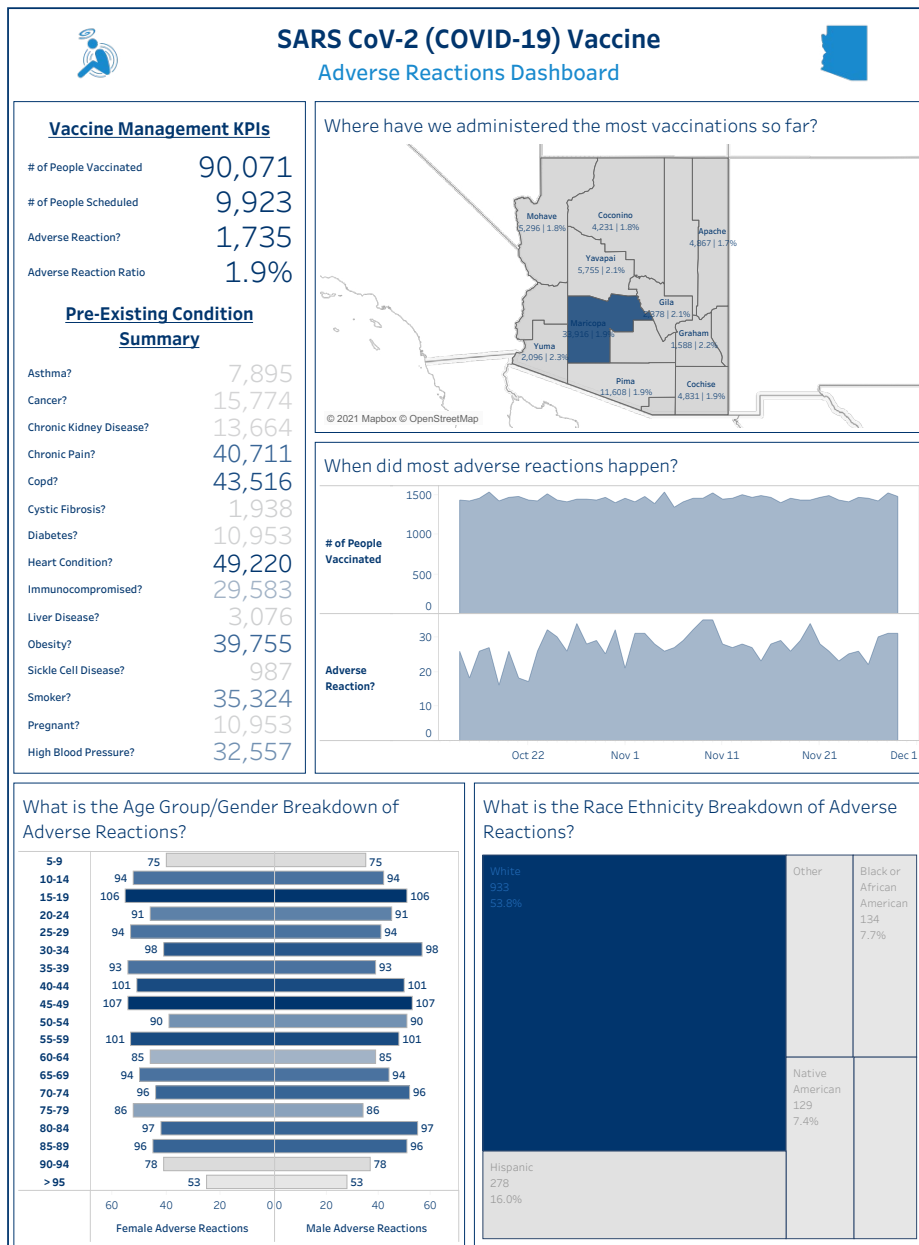
# Inventory Management



The goal is lofty, and a goal like this has never been set before. The goal is to inoculate everyone in every county, city, and small town across America, or at the very least, 60-75% of everyone. With a goal like this, the normal things to expect include shortage of product, shortage of staff, and shortage of facilities. We must manage what we can, and we must manage that with data and analytics.

With the inventory management dashboard, a city/county/state can very effectively see at the macro and micro levels where the greatest need is in the locality, based upon either population, an anticipated forecast, or otherwise an estimate of vaccines to be administered. Additionally, the goal is to serve as a focal point for the allocation and distribution of product as it is ordered and received. Tracking where there are surpluses and shortfalls in inventory can help re-prioritize the distribution of new vaccine lots made available.

## Adverse Reaction Surveillance



Identifying and monitoring adverse events and patient reactions through public health surveillance is necessary for high-quality vaccine safety implementation and research, enabling clinicians, health departments and distributors to ensure the safety of the public.

Successful vaccine program management is predicated on the active monitoring and proactive management of adverse events at the population, sub-population and individual patient level.

Near real-time analysis of weekly, post-vaccination surveys capturing data on any adverse reactions or positive infections makes it possible to identify aggregate anomalies such as a bad lot or batch, necessary for vaccination recall, for example. Patient-level monitoring of events may help improve detection of potentially harmful reactions to a vaccination by a sub-population or individuals. Analysts can proactively monitor a wide variety of data sources, such as the FDA's Adverse Event Reporting System (FAERS) database, which contains adverse event reports, medication effort reports and product quality complaints to quickly investigate new safety concerns.

By improving the experience and managing any side effects, the administration of the vaccine can be a safer and more satisfactory experience for patients and improve the public perception to drive more participation.



## Conclusion

With a data-centric, modern vaccination management solution, it's possible to build a strong foundation for an effective COVID-19 vaccine program. As you have seen in this white paper, the Tableau platform enables organizations to see and understand the complex array of data involved in administering a comprehensive vaccine management program. Using Tableau, you can create powerful visual analyses, collaborate across teams, share valuable insights, and identify areas for improvement.

Achieving the objectives of this historic, global undertaking is the ultimate readiness test, proving that without the right information at the right time, we lack the fundamental insights that makes good vaccine management possible. And we also know that this crisis will not be our last; to be ready for what's next, we need to continue to lead with a data-first mindset, ensuring that across our organizations, our most critical decisions are data-driven.

## Related resources

[COVID-19 Data Hub](#)

[Modern Vaccine Management](#)

### On-demand vaccine management webinars

[Analytics for Vaccine Management](#)

[Modern Vaccine Management Powered by Data](#)

[How Government Agencies Can Use Data to Manage Through a Crisis](#)

[COVID-19 Government Data Track](#)

[COVID-19 Government Transparency Tableau Dashboards Across the Americas](#)

[The Data Culture Playbook](#)

## About Tableau

Organizations around the world are using Tableau to help navigate through the coronavirus pandemic and beyond. Find out how our platform can help your organization to see and understand their data by enabling self-service analytics, allowing collaboration, and swift insight-to-action. Try Tableau for free today.

