InnovateOhio Platform COVID-19 Vaccine Data Analytics

Category: Data Management, Analytics & Visualization

State: Ohio

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Project Initiation and End Dates: August 2020 - May 2021

Executive Summary

Since the onset of the COVID-19 pandemic in March of 2020, citizens and the government alike knew the light at the end of the tunnel would be the creation and distribution of a vaccine to combat the virus. Not only did researchers have the daunting task of developing this vaccine, federal and state government alike had to prepare to properly make this medicine available to citizens, while tracking on the back end where these vaccines were being allocated, gathering proper documentation, and performing ongoing analysis of the vaccine program. After researchers received approval for the Moderna, Pfizer, and Johnson and Johnson vaccines, states were tasked with distributing and accurately tracking the dispersion of these vaccines. Ohio's COVID-19 Data and Analytics Strikeforce quickly engaged to prepare citizens and providers for the mass rollout, tracking, and analysis of the COVID-19 vaccine.

Idea

COVID-19 Vaccination Dashboards

The Ohio Department of Health (ODH) partnered with the InnovateOhio Platform (IOP) to deliver the COVID-19 Vaccination Dashboards publicly via the coronavirus.ohio.gov website the day after the first COVID-19 vaccination was administered in Ohio on December 14, 2020. The purpose of this dashboard is to provide COVID-19 vaccine data to the public and stakeholder organizations interested in tracking and improving vaccine uptake. In order to gather data, COVID-19 vaccine providers send line level vaccine administration data to ODH through the state's immunization registry called ImpactSISS. IOP then ingests, geocodes, and curates to organize and provide analytical views of the immunization data. The InnovateOhio Platform Data and Analytics team ultimately curates views such as a view for The Centers for Disease Control (CDC), throughput analytics, event level metrics, and analytical models to solve for questions not easily answered from the raw data.

CDC
- Individual-level data on Ohioans who have received the COVID-19 vaccination is sent to the CDC via an automated CSV file on a daily basis.

Metrics & Analysis
- These views contain more fields, and different dashboards are available for external consumption on coronavirus.ohio.gov and internal consumption to the ODH, IOP Data Team, Governor's Office and other stakeholder groups such as agencies focused on health equity, the elderly population, and numerous vaccine distribution channel groups, among others.
- Externally, provider-level information is visualized at the county-level, and includes data on the overall number and percentage of Ohioans vaccinated, including ability to breakdown data by:
  - Age group
  - Sex

- Race/ethnicity
- Internally, ODH and IOP are able to view additional data, including:
  - # of people vaccinated (1st and 2nd doses), by county
  - # of people vaccinated (1st and 2nd doses), by provider
  - # of people lost to follow-up, by provider
  - By provider, # and % vaccinated by age group
  - By provider, # and % vaccinated by sex
  - Throughput:
    - By provider, # of doses delivered
    - By provider, # of doses administered
    - By provider, # of doses ordered
    - By provider, # of doses on hand
  - Health equity dashboards, including those that breakdown vaccine administrations and providers at the census tract level with accompanying rates compared to populations
  - Mass vaccination metrics (by site, demographics, etc.)
  - Provider enrollment details and metrics
  - Source system data quality dashboards
  - Elderly and Long-Term Care Facility (LTCF) dashboards
  - Target population dashboards
  - K-12 vaccinations
  - Download capabilities are made available publicly for media and stakeholders to perform their own analysis
  - Some internal dashboards are provided securely through authentication and row level security via the DataOhio Portal (data.ohio.gov) to local health departments to provide them more granular data from the same dashboards and views that ODH uses internally.
- Flexibility is built into the dashboards allowing countless questions to be answered through filters, sliders, and drill through functionality
- Data is sent daily to the CDC via a CSV file
- The Metrics & Analysis dashboards are displayed internally and externally via Tableau dashboards
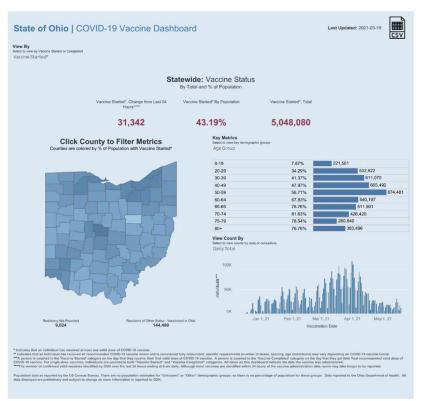
Figure 1: State of Ohio COVID-19 Vaccine Dashboard, no drill-downs selected, downloaded 5/20/2021
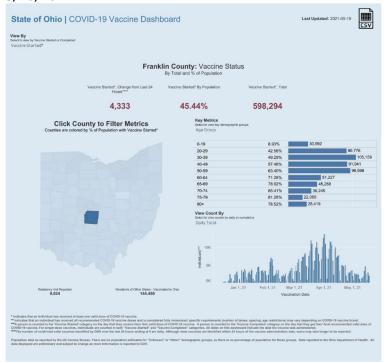

Figure 2: State of Ohio COVID-19 Vaccine Dashboard, Franklin county-level data selected, downloaded 5/20/2021

COVID-19 Vaccination Provider Location Dashboard

In addition to the COVID-19 Vaccine Dashboard, citizens are also relying on the COVID-19 Vaccine Provider Locations Dashboard for the latest information on where and how to receive the shot. This tool displays providers throughout Ohio who have received shipments of COVID-19 vaccines for those currently being vaccinated in eligible Phases 1B-C and Phase 2. Users can search by county or ZIP code to see a list of providers near them. Websites, contact information, and addresses listed are submitted by vaccine providers. As new providers are registered, provide vaccination location information, and receive shipments, they will be added to this page. This dashboard is updated daily at 2:00 p.m.
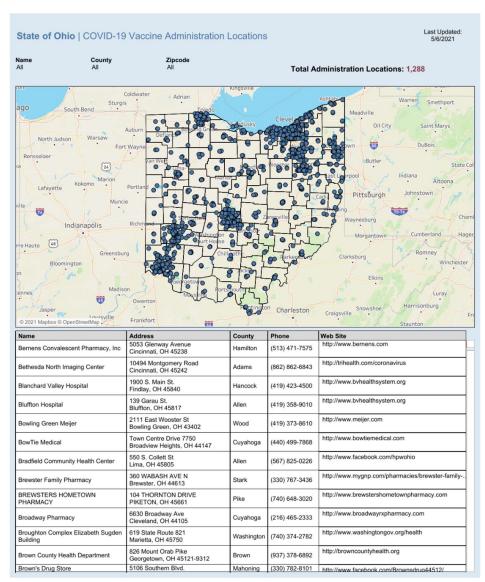

Figure 3: State of Ohio COVID-19 Vaccine Administration Locations, downloaded 5/20/2021

Ohio | Department of Administrative Services

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Implementation

The State of Ohio COVID-19 Vaccine Administration dashboard was released the day after the first vaccines were administered in December 2020. One of Governor DeWine's priorities with vaccination rollout included making sure that vaccine access was equitable across all 88 Ohio counties. To date, the vaccine administrations dashboard has been viewed over six million times.

In addition, the Vaccine Administration Locations map raises awareness to the public on where vaccine shots can be obtained. This is enabled through integrating data from the allocation module and throughput inventory analytics to determine which providers should appear on the map. To date, the vaccine administration locations map has been viewed over 15 million times.

Internally, detailed demographic information by race, ethnicity, age, and sex, with a focus on geo-location, is used to analyze vaccine availability and administrations at the census tract-level. The goal of this initiative is achieving low Social Vulnerability Index (SVI) census tracts to reach and improve access and vaccine uptake by the state's most vulnerable populations.

Internally, using provider throughput analysis, the State is able to gain an understanding of where vax allocations should be distributed, by looking at channel performance (Local Health Districts, Pharmacies, Healthcare Systems, etc.) and turnaround time from delivery to shot, approximating inventory on hand without a State-level vaccine inventory system. This helps allocate vaccine to providers with low on hand inventory and those achieving high throughput.

To ensure the legitimacy of the data populating the dashboards, the IOP team utilizes data quality dashboards. These dashboards include numerous exception reports to monitor and improve source-system data quality coming from providers.

Additionally, numerous dashboards have been deployed to focus on certain populations including the elderly, ages, schools, and race/ethnicity. These dashboards have a heavy focus on vaccination rates compared to the overall population of the associated group to identify potential issues and focus areas.

Impact

Because COVID-19 vaccine information is so accessible and easily digestible on the coronavirus.ohio.gov website, Ohioans are empowered to make informed decisions when it comes to their health and playing a role in ending this pandemic. In order to continue strategically combating this virus, Ohio had to make sure no missteps were made with vaccination rollout and record keeping. Vaccine provider throughput analysis informed vaccine allocation processes to drive scarce vaccine resources to high-performing and high-throughput providers.

In order to help communities that need it most, health equity analysis helped ensure providers were enrolled and vaccines allocated to areas with highly vulnerable populations. To specifically ensure each community's needs were met, more granular vaccine data was provided to Local Health Districts daily, which allowed these groups to create strategies for improving vaccine uptake in their community.

Recently, Ohio has received national and international attention through our innovative Vax-a-Million program championed by Governor Mike DeWine. As vaccine rates across the country have plateaued and then declined, this program was implemented to help improve vaccine uptake and thus save lives and prevent adverse outcomes. The program offers a chance for people who have been vaccinated to be entered in five $1M lotteries for those 18 years and older and five chances for a full ride scholarship to an Ohio public university for those aged 12-17. Monitoring the impact of the program has been essential to understand if it has been effective. Data driven vaccine analysis has been central to understanding and articulating the effectiveness of the program. Some recently publicized impacts, following the announcement of Vax-a-Million program, from the data analysis include:

- An increase in vaccination rates among Ohioans 16 and older by more than 28 percent after the announcement of Vax-a-Million, after dropping 25% in an equivalent period prior to the announcement
- A 94% increase in vaccinations among the 16-17 year old age group
- A 55% increase in vaccinations among the 20-49 year old age group
- A 65% increase in vaccinations in rural populations in Ohio
- Increases in vaccinations among all demographic groups, including minorities in Ohio

Finally, through implementing a high degree of automation across data integration, data curation, and data visualization workstreams, allowed the IOP Data Team to ensure data consistency across the over 100 dashboards, and focus on new projects and enhancements to satisfy a constant need for new analyses.