/// **Case Study**

Houston Health Department

The Houston Health Department teamed with Syntasa, a premiere Google Cloud partner, to build an effective tool which leveraged new sources of digital behavior to help Houston increase vaccine access and outreach across the city – while understanding and guiding equitable distribution to vulnerable populations. In the future, the same platform will enable the city to harness the power of the digital revolution to improve the lives of Houston citizens.

BACKGROUND

The mission of the Houston Health Department (HHD) is to promote the health and social well-being of Houston residents and the environment in which they live. In response to the Covid-19 pandemic, the department launched a public health campaign to promote safe and equitable distribution of the Covid-19 vaccine to as many Houston residents as possible.

To support this campaign, HHD is working with digital behavior and big data experts Syntasa to create a data-driven solution to track vaccine hesitancy and overall vaccine sentiment across the city. Using both Houston-specific data sources, as well as other publicly available sources, Syntasa and HHD developed scalable, easy-to-access, and constantly updating dashboards to analyze vaccine hesitancy in Houston at the zip-code level to improve outreach and ultimately increase vaccination rates among constituents.

CHALLENGE

With 2.31 million people, Houston is the most populous city in Texas and the fourth-most populous city in the United States. Like other large populations across the United States, vaccination rates and views around the Covid-19 vaccine vary widely across different communities and areas in the city. HHD's goal is to increase its understanding of vaccine hesitancy and other vaccine sentiment at a local level, so they can target vaccination programs and communications and outreach campaigns accordingly. For example, identifying zip codes with low hesitancy and low vaccination rates shows HHD the areas of greatest vaccination opportunity so they can increase access and outreach in that area. Including social vulnerability data also helps provide an equity perspective to ensure that activities contribute to an equitable distribution of vaccines across the city to those residents who need it most.

Key Points

- Identified low hesitancy and vaccination rate populations and provide increased access and outreach to drive vaccination.

- Equitable distribution achieved through use of social vulnerability data

- Platform provides gateway to future use cases

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SOLUTION

Syntasa worked with the Houston Health Department to bring together several different data sources and develop two main dashboards. The primary data included COVID-related surveys on HHS digital properties, social media posts, news articles, and searches on Google. The two main dashboards include a Sentiment Analytics Dashboard, which identifies and continuously tracks vaccine hesitancy at the zip-code level across the greater Houston area, and a Narrative Dashboard, which applied Natural Language Processing (NLP) technology to open-ended text from surveys and social media to gain a richer qualitative understanding of vaccine-related conversations across the city.
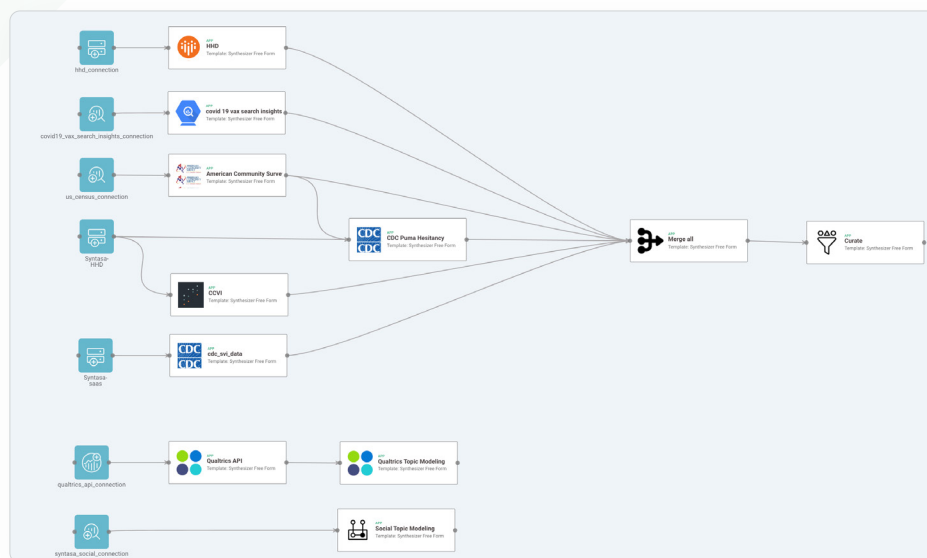
Sentiment Analytics Dashboard

To produce the Sentiment Analytics Dashboard, Syntasa analyzed Houston-specific data, including HHD vaccination data and case rates, along with other Covid-specific data sources such as the American Community Survey, CDC Public Use Microdata Areas (PUMA) hesitancy data, Google Covid-19 Vaccine Search Insights, CDC Social Vulnerability Index, and Carnegie Mellon University's COVIDcast surveys.

Traditionally, governments have used polling to gather sentiment data from constituents. However, polling is expensive, cannot track sentiment over time, and typically covers broad geographic areas. Using big data and analytics, HHD and Syntasa were able to provide sentiment analytics at a much lower cost and much higher level of specificity, in order to ensure efficient resource allocation across the city. In particular, data like the CDC Social Vulnerability Index, which uses census variables to help local officials identify communities in need of support, helped HHD identify where to target their outreach to ensure equity.

Syntasa software, running within the Google Cloud Platform, was used to build several production-grade data pipelines, in order to ingest and cleanse data, align and combine multiple data sets, apply AI and ML algorithms, and make these insights actionable by feeding dashboards and downstream users. The dashboard provides advanced insights at a hyper-local geographic level, enabling HHD to identify zip codes with high levels of opportunity and target outreach and persuasion campaigns according to this data.Map views in the dashboard illustrate the data in a comprehensive, easy-to-understand manner.

"Data drives decisions in our health department, especially when it comes to ensuring access and equity in our COVID-19 response. Google Vaccine Search Insights (VSI) added an additional layer of actionable information that we combined with our existing robust data to validate and more precisely target our vaccination messaging and outreach."

*– Stephen L. Williams, Director, Houston Health Department*

Narrative Dashboard

Understanding the various narratives around the Covid-19 vaccine, from both vaccinated and unvaccinated residents, is crucial to formulating effective messaging, crafting informed policy decisions, and rolling out an equitable vaccination campaign city-wide. To this end, HHD and Syntasa built the Narrative Dashboard, which analyzes open-ended text responses from surveys and social media to identify Covid-related topics that are top of mind for residents and how attitudes around these topics change over time. Syntasa used Google's world class artificial intelligence and machine learning capabilities to process unstructured data from two main sources:

1. Qualtrics surveys conducted by the Houston Health Department: HHD used Qualtrics to conduct surveys of over 17,000 Houston residents regarding their vaccination status, including open questions with freeform responses.

2. Social media posts: Syntasa created models to ingest and analyze approximately 10,000 - 20,000 public comments posted to Houston area Facebook pages each month.

The Narrative Dashboard can be used by internal and external stakeholders to better understand prominent narratives and attitudes around vaccination at a given moment, and help problem-solve ways to combat falsehoods and address barriers to vaccination.
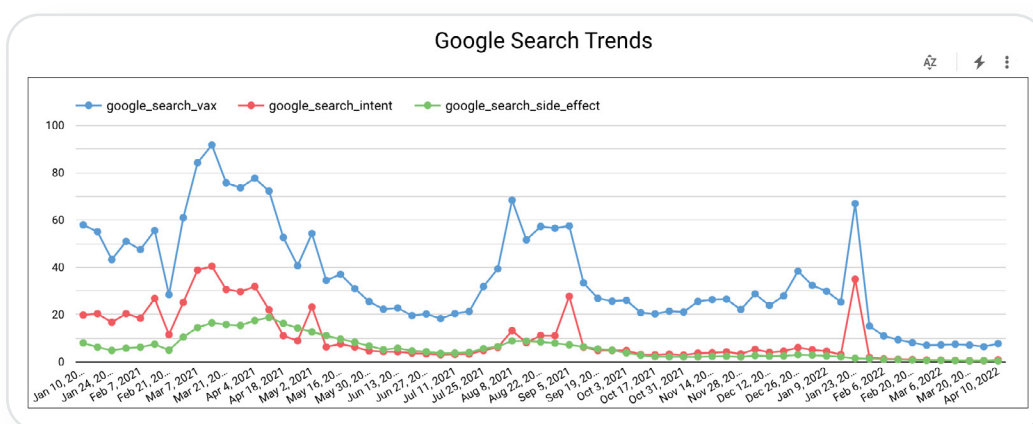
RESULTS

The Houston Health Department's goal is to increase vaccination rates for Houstonians and improve access to the vaccine for all residents. Sentiment data around constituent's hesitancy and general attitudes to the vaccine are a key component of this effort. HHD continues to use the sentiment analytics data surfaced by Syntasa to create a continuously updated Target Opportunity Population, calculated by subtracting vaccinated residents and highly hesitant residents from the total city population. They can then use this location-specific information to target vaccination campaigns and ultimately increase vaccination rates. HHD can also leverage the insights from collected data to develop and execute effective marketing campaigns and communications efforts to support these efforts in high opportunity zip codes.

Looking forward, there are myriad additional use cases for the data dashboards. The platform could help address future HHD priorities with data-driven insights, such as opioid and substance abuse prevention programs and suicide prevention programs. The platform could also be replicated for broader Houston priorities, such as tourism and economic development and 311 support. In general, the platform is replicable to any area in which constituent sentiment is a key driver of government prioritization and policy-making.

Syntasa are digital behavior experts. Our cloud-native application integrates with common digital behavior sources and orchestrates cloud services to leverage the latest advances in AI and machine learning to gain insights. We analyze digital behavior and conversations within the community to gain insights into needs and attitudes, as well as improve the experience of digital services. Syntasa is a Google Cloud Partner and our software is available in the GCP Marketplace.