

# PA State Geospatial Coordinating Board COVID-19 Special Report



## Overview

This special report of the Pennsylvania Geospatial Coordinating Board (PA GeoBoard) was developed to provide insight into how GIS has been used throughout Pennsylvania in response to COVID-19. The information was gathered through a survey that was distributed to the membership of the PA GeoBoard, as well as the County GIS Pros and PAMAGIC membership. This report does not intend to be a comprehensive list of every initiative or application. Its purpose is to highlight some examples of how GIS was used during the first six months of the pandemic.

COVID-19, formally identified as SARS-CoV-2 on January 7, 2020, has spread worldwide and is a global pandemic. In Pennsylvania, the first two presumptive positive cases were announced on March 6, 2020<sup>1</sup>. Geographic Information Systems (GIS) has been used by organizations at all levels throughout the state to address a wide range of COVID-19 related issues.

GIS is uniquely positioned to provide insights into health-related events. While the most obvious applications of GIS come in the form of tracking the spread and distribution of disease, GIS can also be used to analyze social, demographic, and economic aspects of a pandemic.

Access to health care, testing, food supply, jobs, human mobility, agricultural impacts, health and environmental risk factors across populations, and climate data, are all being analyzed through the use of GIS.

## Value of GIS in Addressing COVID-19

The National States Geographic Information Council (NSGIC) is a forum where state governments discuss and collaborate on GIS efforts.<sup>2</sup> On April 17, 2020, the National States Geographic Information Council (NSGIC) and ten other regional and national organizations released a joint statement on the value of GIS in the COVID-19 pandemic. “The spread and effects of COVID-19 can be best understood considering space and time. As governments are responding to COVID-19, more leaders are recognizing the value of “knowing the where.” The importance of knowing where the outbreak is growing, where high-risk populations are, where the hospital beds and important medical resources are, and where to deploy resources is essential. “Knowing the where” informs better decision-making.”<sup>3</sup>

## NSGIC GIS Informs Better Decision-Making

By geo-enabling public health and emergency response data, we can better understand the spread - with COVID case data, movements of people, and symptoms

- Understand the impact on individuals - with data including age, disease, obesity, and medical treatments
- Understand how to tailor outreach - by age, language, engagement with government, and lifestyle choices
- Understand the needs of the healthcare industry - by facility, day, bed capacity, type of care, ventilators, and PPE
- Understand the impact on the local economy - by county, day, unemployment, and bankruptcies
- Understand the societal impacts - by census tract, domestic violence, alcohol consumption, child abuse, animal abuse, elder abuse, mental health crises, 3-1-1 calls, and firearm sales”<sup>3</sup>

# Commonwealth of Pennsylvania Agencies

Pennsylvania agencies are working collaboratively to address COVID-19 via multiple avenues. Agencies gathered data and developed a wide range of applications and services to support response and analysis of the pandemic. The following is a list of some of those efforts.

## Department of Health

The Pennsylvania Department of Health (PA DOH) served as one of the primary resources for COVID-19 in the commonwealth. A wide range of information related to COVID-19 is available on the PA DOH Coronavirus website:

(<https://www.health.pa.gov/topics/disease/coronavirus/Pages/Coronavirus.aspx>)

Included on this website is information showing confirmed, probable, and negative cases, new cases by day, and deaths by day, as well as Daily PCR Tests (updated weekly). It also contains links to information on symptoms and testing, stopping the spread, FAQs and resources, and much more. The case count data, map, and new cases per day data are from Pennsylvania National Electronic Surveillance System

(PA-NEDSS). The deaths by day graph data are from the Electronic Death Registration System (EDRS).

The GIS enabled component of this site is the Pennsylvania COVID-19 Dashboard

(<https://www.health.pa.gov/topics/disease/coronavirus/Pages/Cases.aspx>).

The COVID-19 Dashboard features multiple options for visualizing data including cases by county (Figure 1) and cases by zip code (Figure 2). This Dashboard, which is accessed via the PA DOH Coronavirus website, was developed by the PEMA GIS COVID-19 workgroup, which was comprised of GIS specialists from across agencies. Many of the Dashboards developed in response to COVID-19 were developed by this group.

In addition, the Dashboard allows users to see data on hospital preparedness, cases by demographic categories (Figure 3), and deaths by demographic categories.

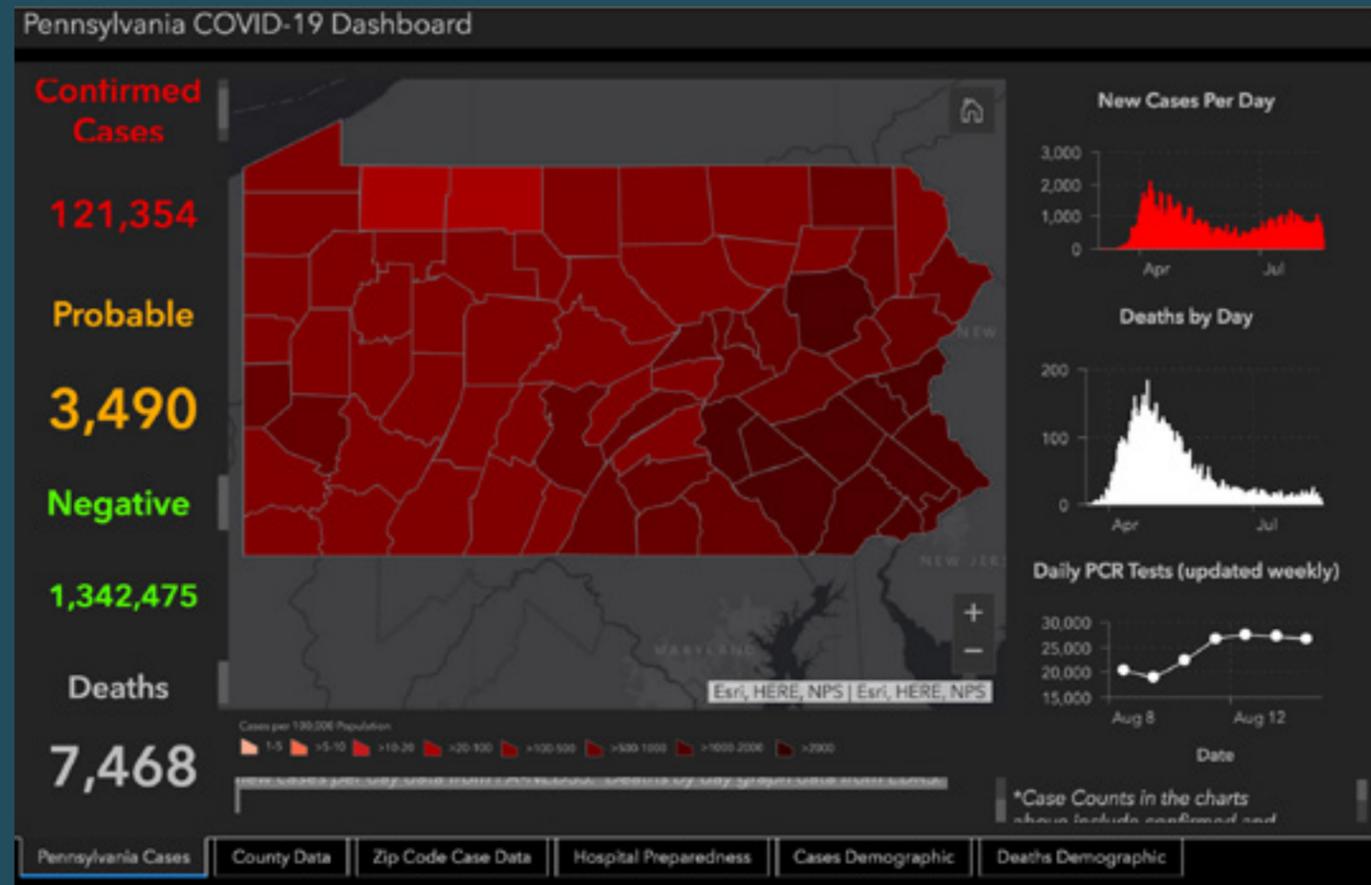


Figure 1. Pennsylvania Department of Health COVID-19 Data for Pennsylvania Dashboard as of 12:00 p.m. on 8/17/2020. This Dashboard shows Pennsylvania cases by county per 100,000 population.

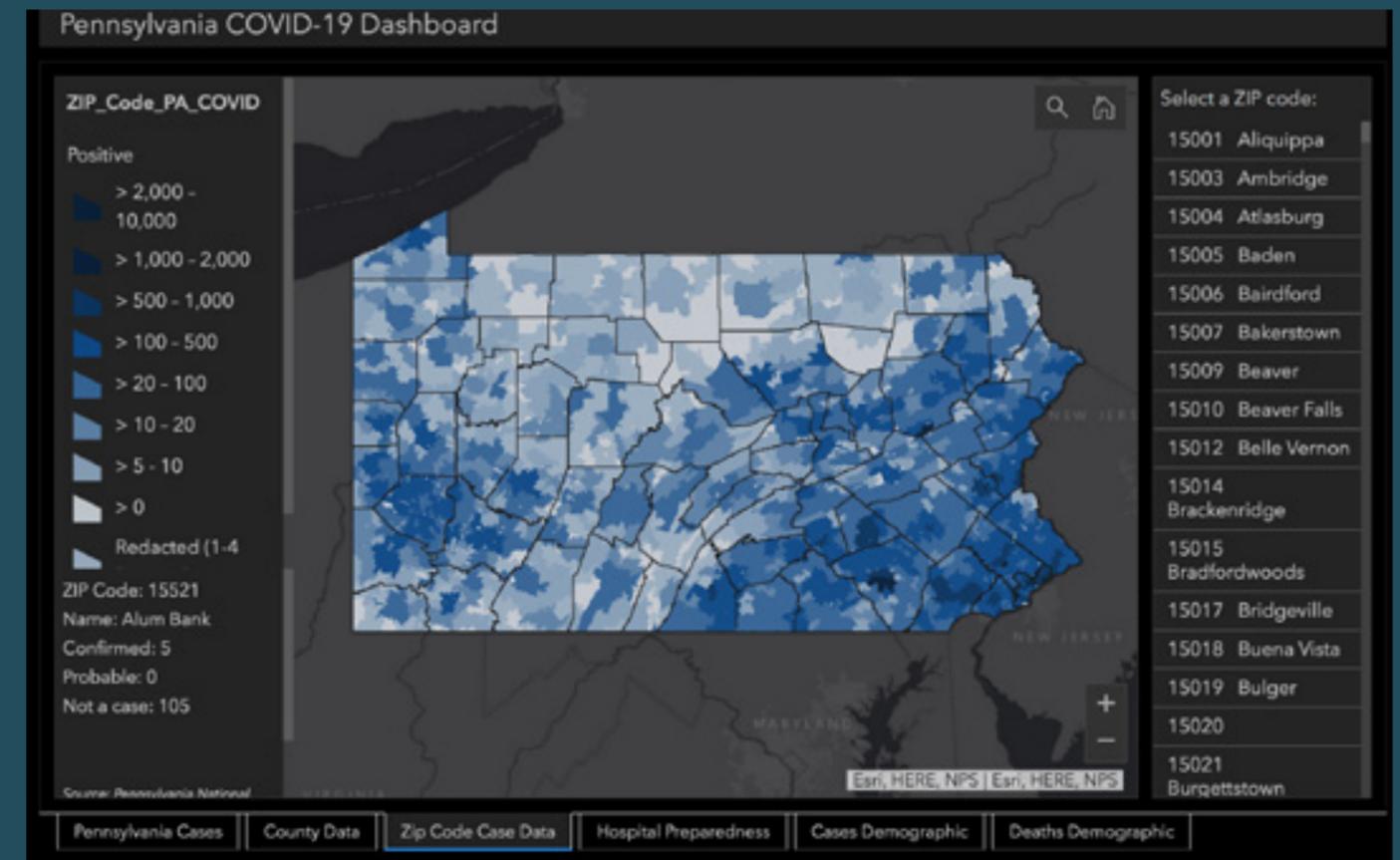
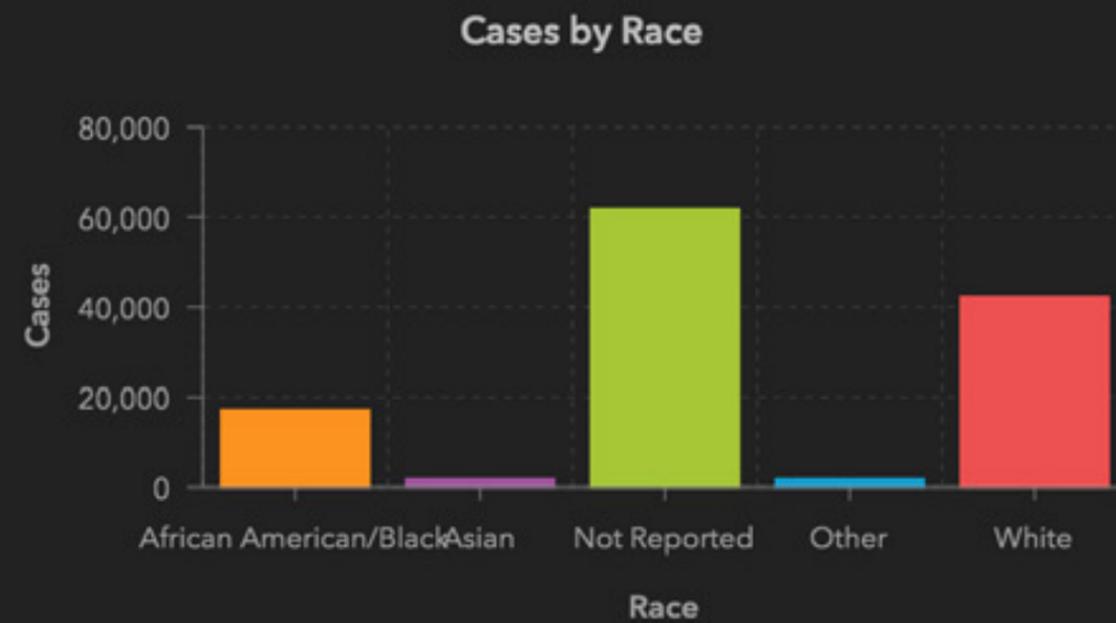
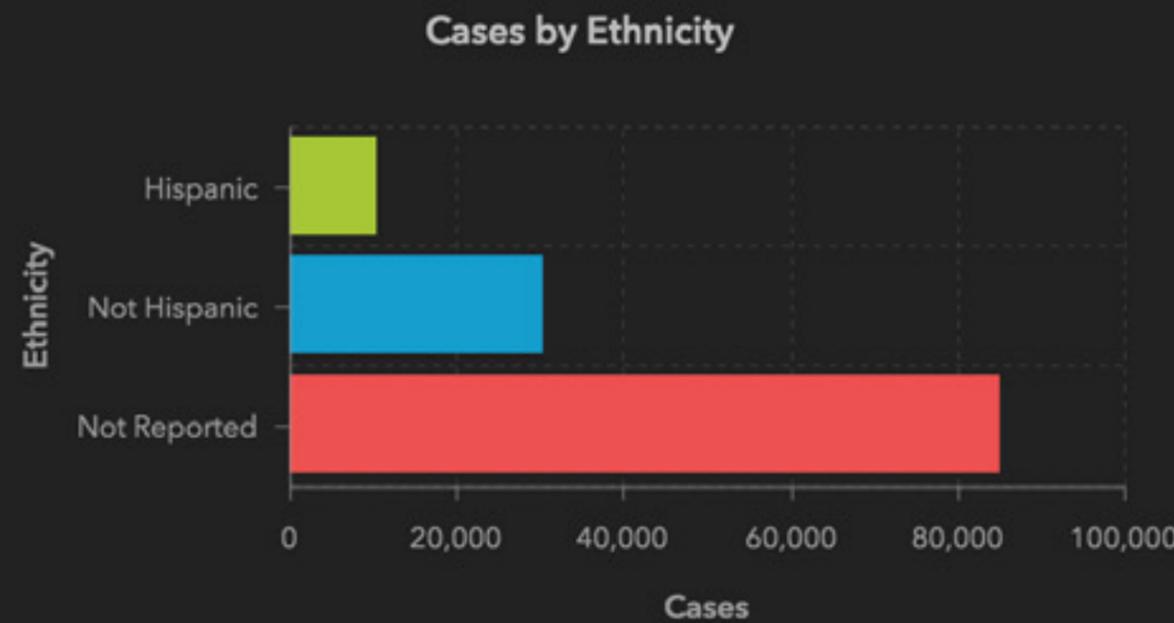
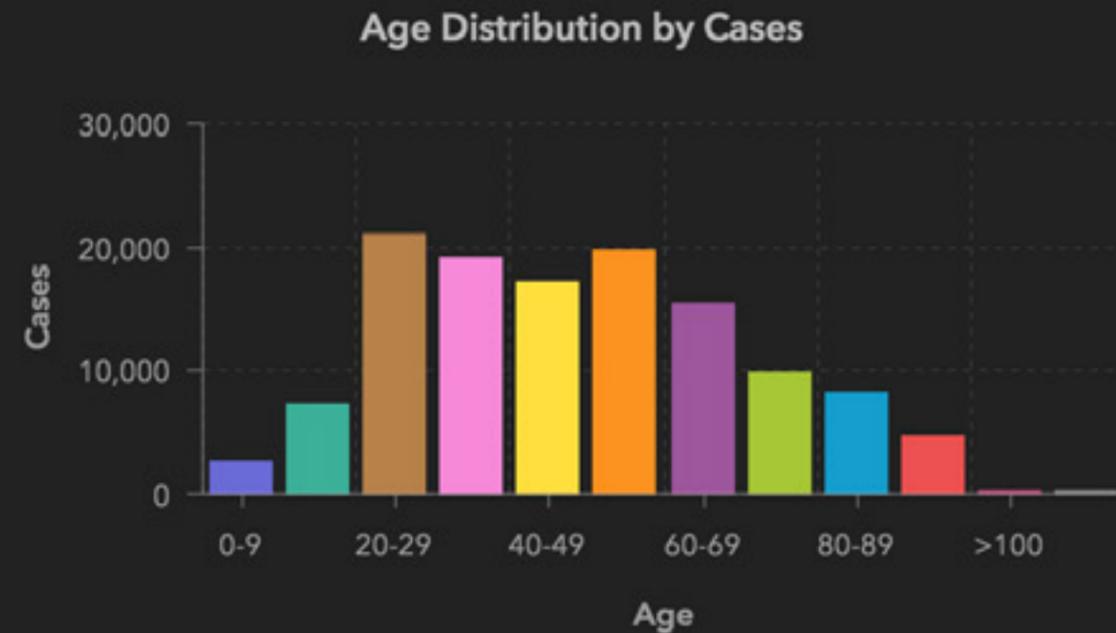


Figure 2. Pennsylvania Department of Health COVID-19 Data for Pennsylvania Dashboard as of 12:00 p.m. on 8/17/2020. This Dashboard shows Pennsylvania cases by zip code.

# Pennsylvania COVID-19 Dashboard



\*Case Counts include confirmed and probable cases. All data from PA-NEDSS

- Pennsylvania Cases
- County Data
- Zip Code Case Data
- Hospital Preparedness
- Cases Demographic**
- Deaths Demographic

Figure 3. Pennsylvania Department of Health COVID-19 Data for Pennsylvania Dashboard as of 12:00 p.m. on 8/17/2020. This Dashboard shows Pennsylvania Demographics.

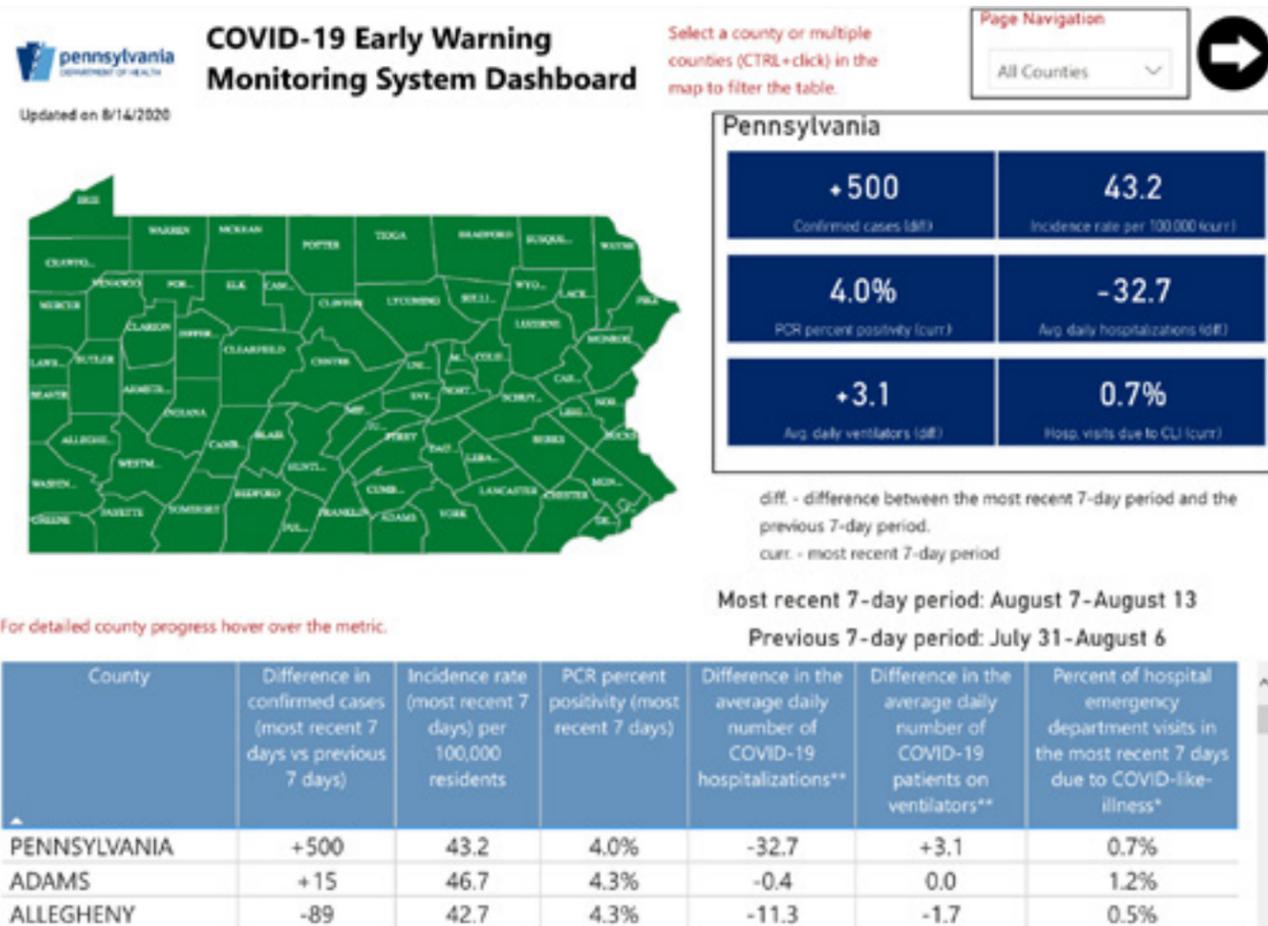


Figure 4. Pennsylvania Department of Health COVID-19 Early Warning Monitoring System Dashboard as of 8/14/2020.

## COVID-19 Early Warning Monitoring System Dashboard

(<https://www.health.pa.gov/topics/disease/coronavirus/Pages/Monitoring-Dashboard.aspx>),

has multiple options in which to view data, including the entire state summary which provides both map based and tabular information (Figure 4), and the ability to hover over the metric or click on the county for more information (Figure 5).

In addition, the PA DOH Early Warning Monitoring System Dashboard provides quick access to data on Pennsylvania and all counties showing newly reported cases, incidence rate of cases per 100,000 population, PCR testing

positivity rate, average daily COVID-19 specific hospitalizations, and more (Figure 6).

The Hospital Preparedness component of the Dashboard provides information including intensive care beds, medical beds, isolation rooms and ventilators by county (Figure 7) and in tabular form (Figure 8).

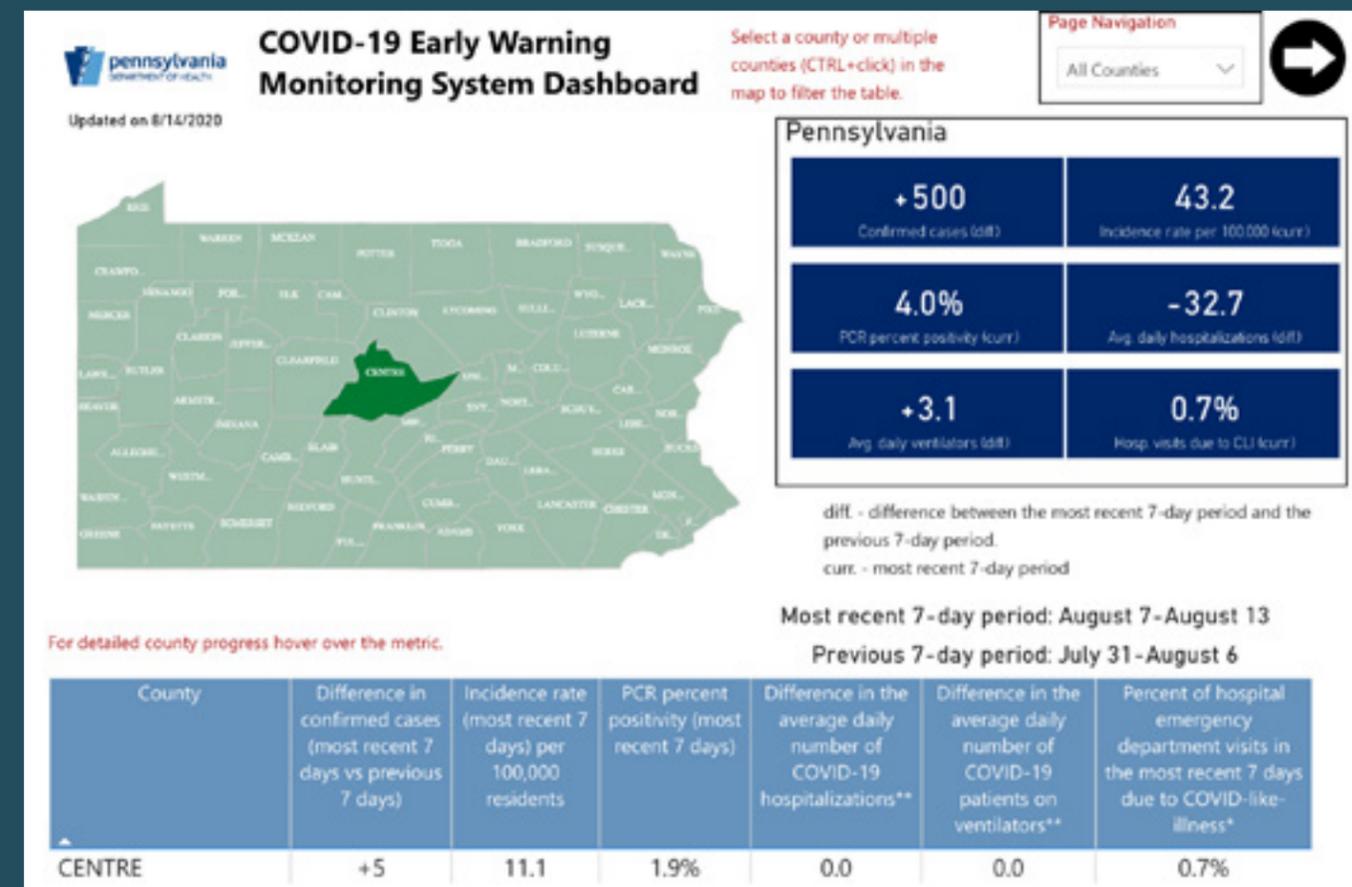


Figure 5. Pennsylvania Department of Health COVID-19 Early Warning Monitoring System Dashboard Centre County information as of 8/14/2020.

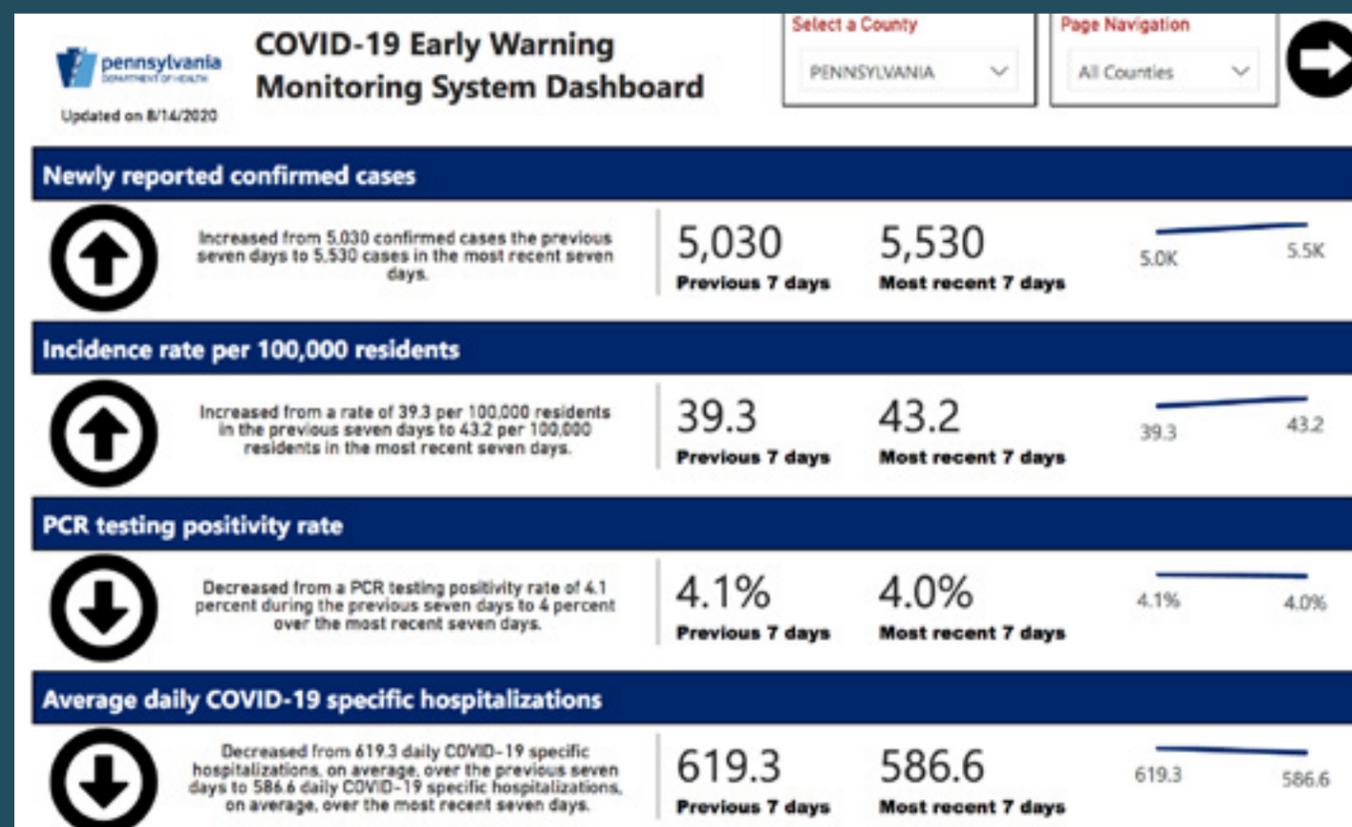


Figure 6. Pennsylvania Department of Health COVID-19 Early Warning Monitoring System Dashboard as of 8/14/2020.

COVID-19 Patients Hospitalized

1,174

COVID-19 Patients on Ventilators

257

COVID-19 Patients on ECMO

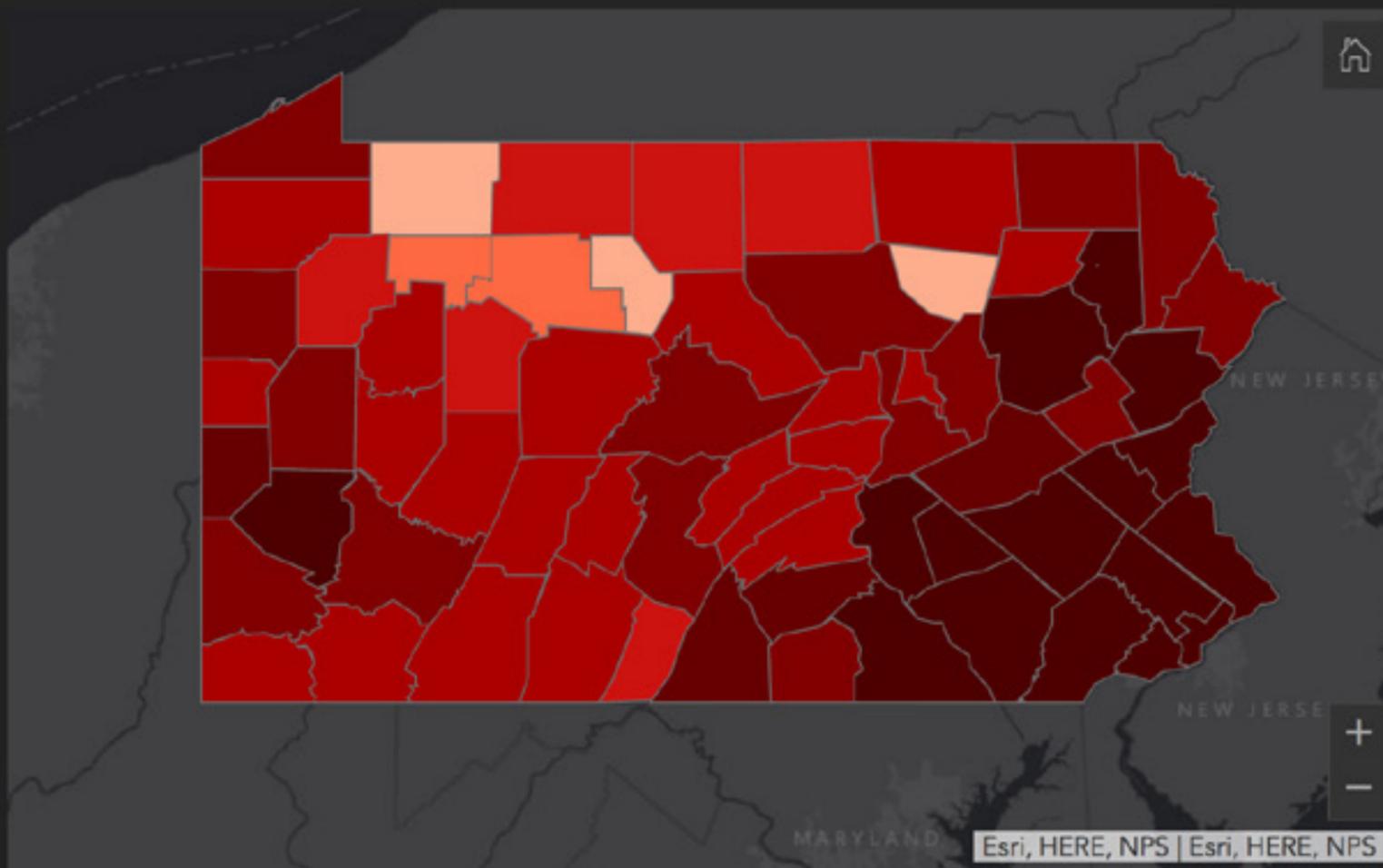
11

Total Ventilators in Use



The total number (COVID-19 and non-COVID-19) of ventilators in use is indicated by the red band and shown as the number in the center of the gauge.

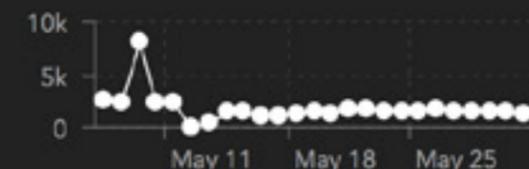
Source: Department of Health Corvena (formerly KC-HIMS)



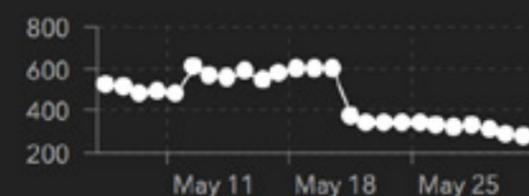
Average Daily ICU Bed Availability (Past 14 Days)



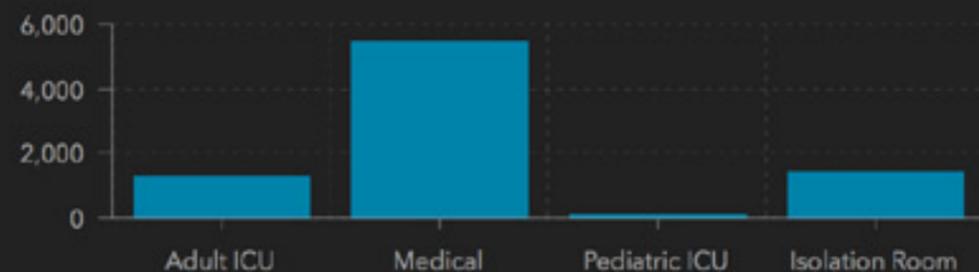
Average Daily COVID-19 Patients Hospitalized (Past 14 Days)



Average Daily COVID-19 Patients on Ventilators (Past 14 Days)



Available Beds (Total Counts)



Available Beds (%)

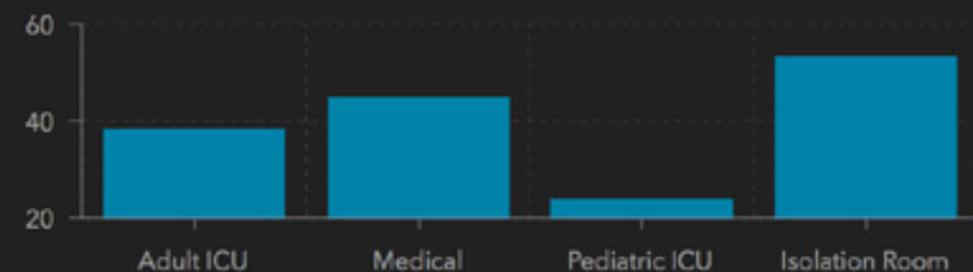


Figure 7. Pennsylvania Department of Health COVID-19 Hospital Preparedness Dashboard county view as of 4/8/2020.



Figure 8. Pennsylvania Department of Health COVID-19 Hospital Preparedness Dashboard as of 9/4/2020.

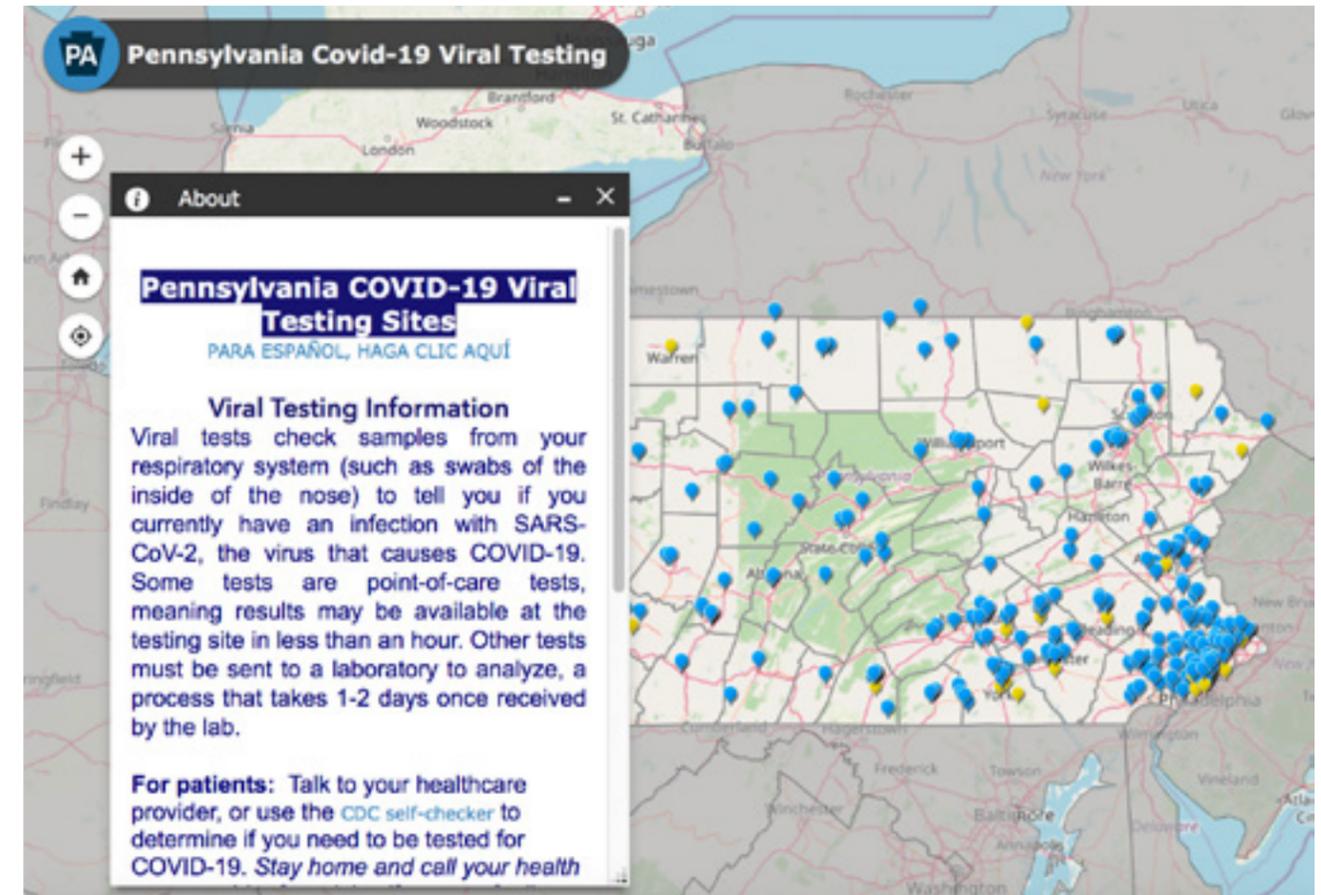


Figure 9. Pennsylvania Emergency Management Agency COVID-19 Testing Sites as of 9/4/2020.

## Pennsylvania Emergency Management Agency

The Pennsylvania Emergency Management Agency (PEMA) developed over 40 products, services, and applications to support the statewide response to COVID-19. These included dashboards, a data HUB, surveys, and applications. PEMA's GIS COVID-19 workgroup developed the Dashboard available via the PADOH Coronavirus website (*see above*) and worked with other agencies on initiatives such as Feeding Needs in Pennsylvania and Hospital Preparedness (*see below*) and a COVID-19 Testing Locations application (*Figure 9*).

In addition to its many other efforts, PEMA provided its county Emergency Management Agency (EMA) partners access to a HUB site which served as a repository for information that could be shared easily and quickly across multiple organizations. Information was categorized by Emergency Support Functions (ESFs) for ease of access. The HUB included the

daily operations brief, weather brief, and Senior Leadership Brief, as well as access to information dashboards and a link to the COVID-19 Department of Health page. PEMA also held weekly briefings for counties and posted recordings for counties to refer to later. Moving forward, this will be transitioned to an "all hazards" HUB site, that will allow counties to find information they need quickly and easily.

### Pennsylvania Department of Transportation

PennDOT GIS developed a web map to assist executives and management in planning the re-opening of department activities. Initially, the project was solely PennDOT data and assets. During the development of the map, requests were made to include spatial layers from the Departments of Education and Health. Third party

layers were also incorporated, including cellular coverage, broadband access and airports.

PennDOT also worked with the Department of Education and Department of Health to acquire data to create shared web maps and applications. PennDOT shared data with other organizations, agencies, and planning partners for their COVID-19 efforts. This included boundary layers, traffic information and project updates. Staff conducted research to locate and incorporate data from federal agencies, private companies and other sources. PennDOT created a Re-Opening map that was shared internal and with executive staff.

### Other Commonwealth Initiatives

Food Vulnerability and Feeding Needs in Pennsylvania (multiagency initiative)

<https://pema.maps.arcgis.com/apps/MapSeries/index.html?appid=2594695d0d634674964a85cee050cfca>

The Feeding Needs in Pennsylvania Application takes advantage of spatial data to analyze areas of food source vulnerability across Pennsylvania. The vulnerability analysis weights variables such as population, median household incomes, current unemployment statistics, and grocery store clusters (*Figure 10*).

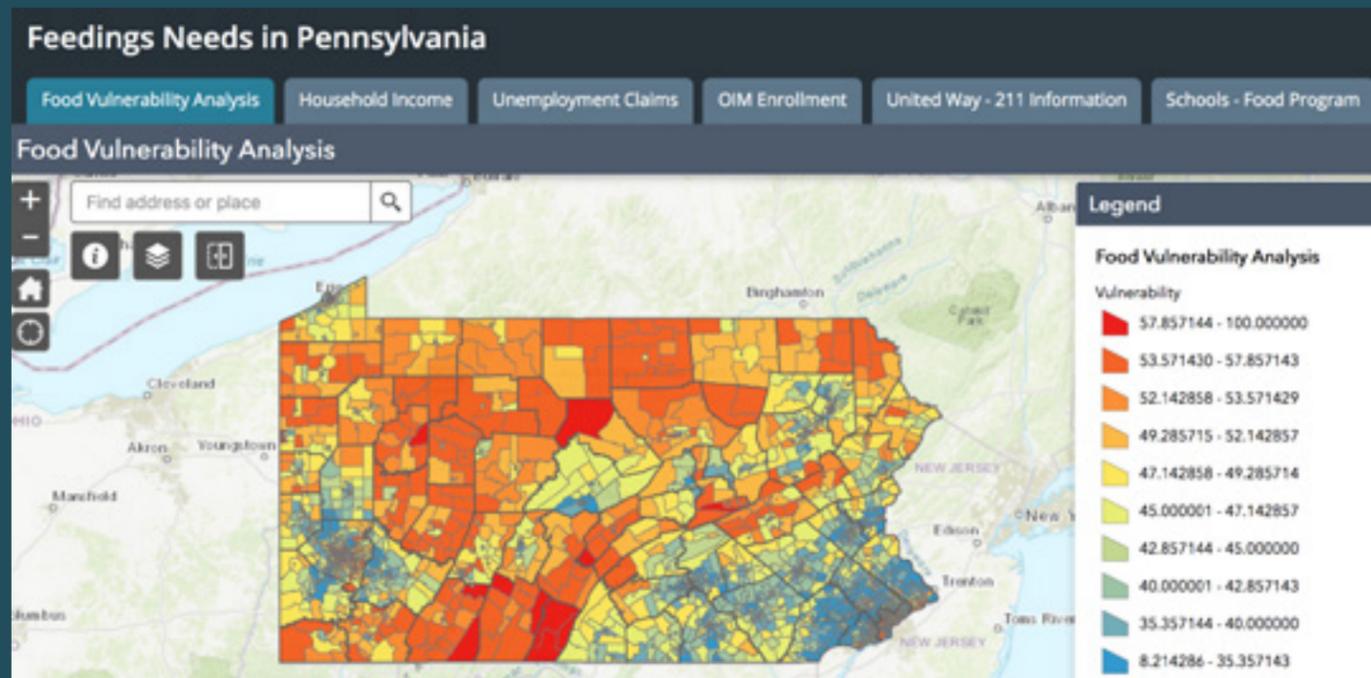


Figure 10. Feeding Needs in Pennsylvania, Food Vulnerability Analysis as of 8/18/20.

Standing alone, each of these datasets only started to determine areas of food vulnerability across the state. However, once combined the information accurately identifies spatial gaps in availability, and identifies the need to distribute immediate food resources to affected residents.

The application incorporates United Way 211 data for food bank locations and farmers market locations.

In addition, this application includes statistics on each school district's free and reduced lunch program, and a Survey123 feeding needs form that's publicly available for participants to make online entries.

The Office of the First Lady coordinated this effort in collaboration with the GIS Food Task Force, made up of GIS specialists from PEMA, PennDOT, Pennsylvania Game Commission, and the Conservation and Environmental Delivery Center.

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## County and Regional Governments

Many counties created informational websites, dashboards, data hubs, and mapping applications.

### Adams County

Adams County created applications and resources that focused on multiple aspects of the pandemic. In particular, the county provided information related to access to food including:

- Backpack programs provide food directly to children when school resources are not available, such as weekends and school vacations.
- Farms/Markets sell fresh produce and local products and are important to the communities' local food system. Markets may accept or double SNAP benefits and/or USDA Pennsylvania Farmers Market Nutrition Program vouchers for WIC participants or low-income seniors.
- Food Pantries coordinate the distribution of supplemental foods to families with an income under 150% of the Federal Poverty Guidelines.
- Senior Centers offer people age 60 and over a place to go for nutritious meals, social activities, and a range of programs such as health screenings, health and consumer education, creative arts, exercise, and other special events which are unique to individual centers.
- Soup Kitchens provide daily, no cost nutritious meals.
- Student Meals provided by local school districts during major school closings.

The county created an interactive map of all food banks, soup kitchens, schools and libraries to aid with food distribution for low-income families.

<https://adamsgis.maps.arcgis.com/apps/webappviewer/index.html?id=2ed2fd609238448ab48755128ed1aaa7>

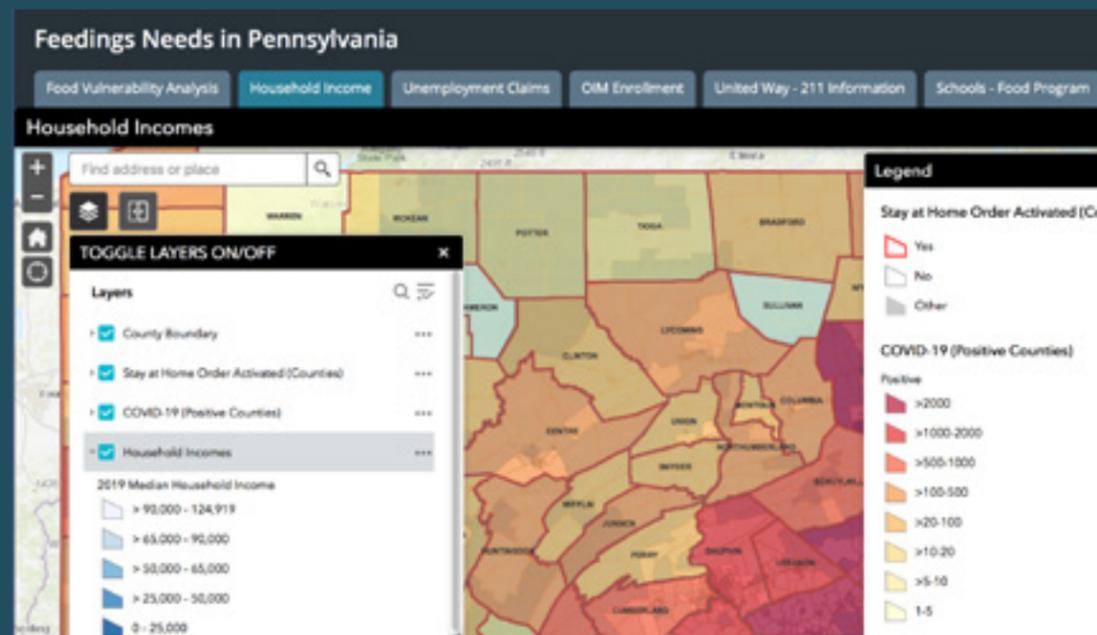


Figure 11. Feeding Needs in Pennsylvania, Household Incomes and Stay at Home Order Activated by County as of 8/18/20.

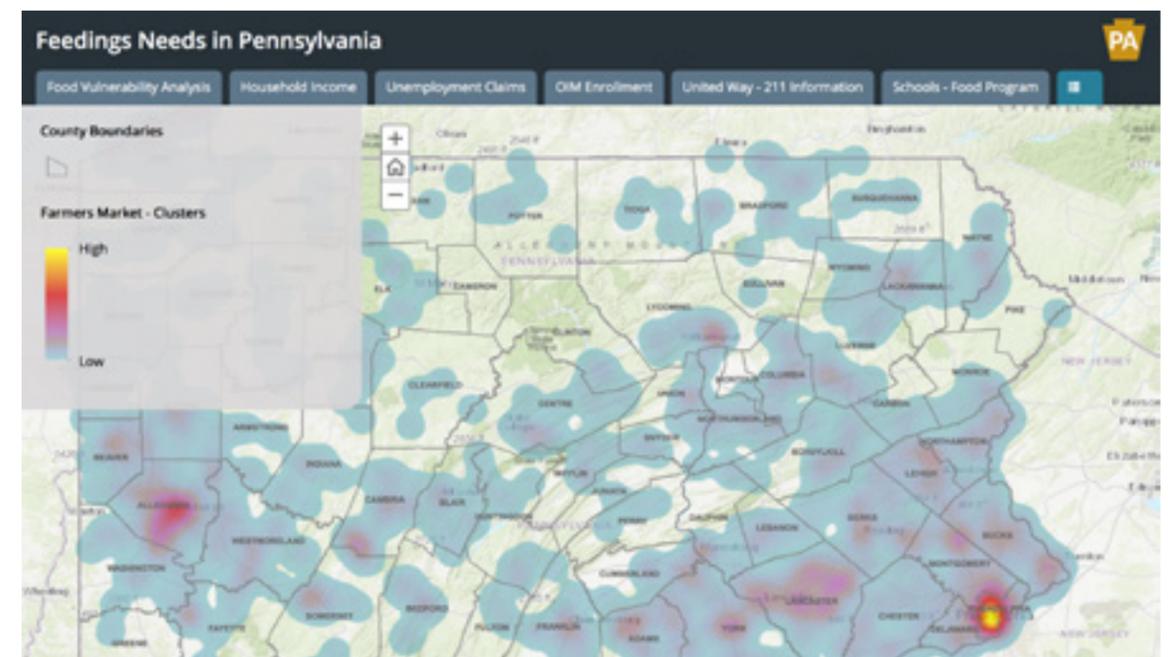


Figure 12. Feeding Needs in Pennsylvania, Farmer Market Locations as of 8/18/20.

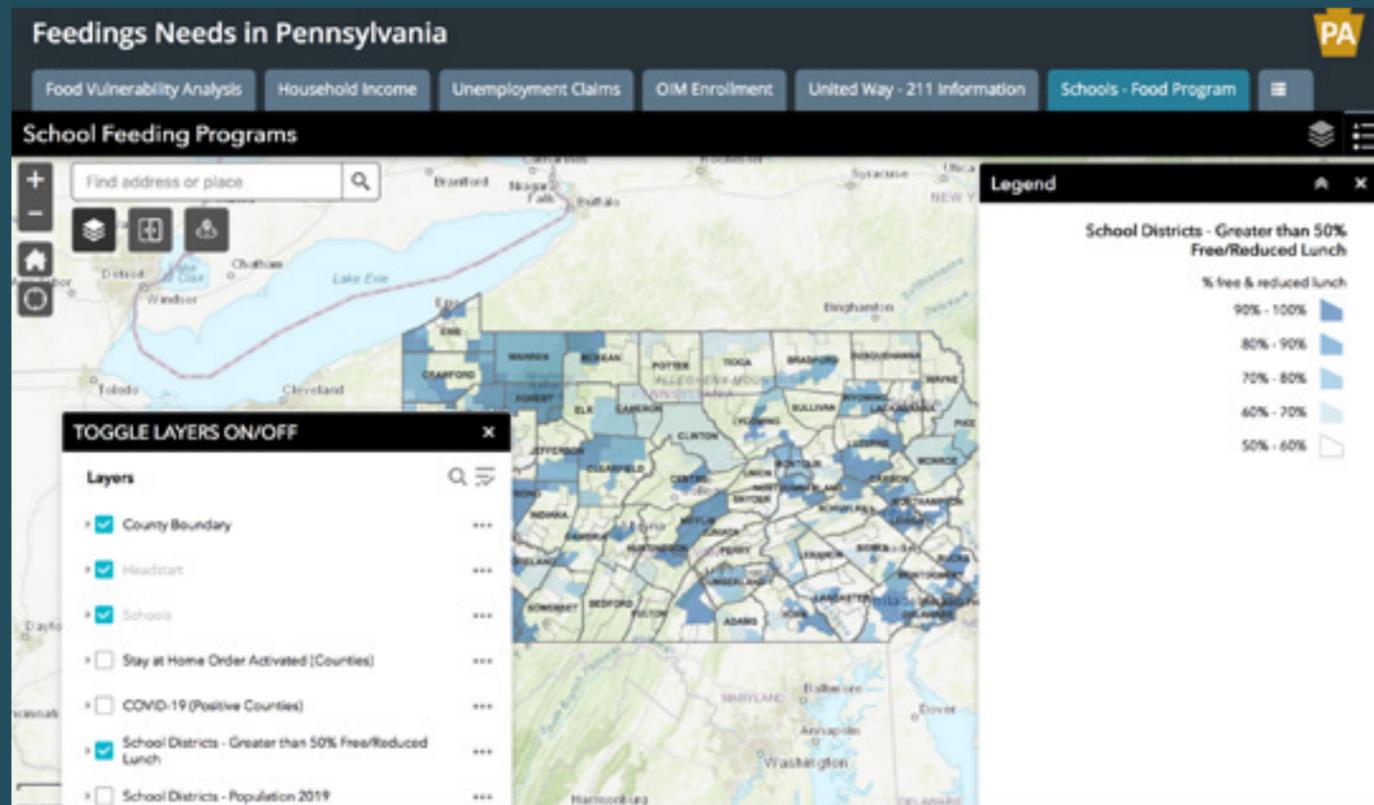


Figure 13. Feeding Needs in Pennsylvania, School Feeding Programs as of 8/18/20.

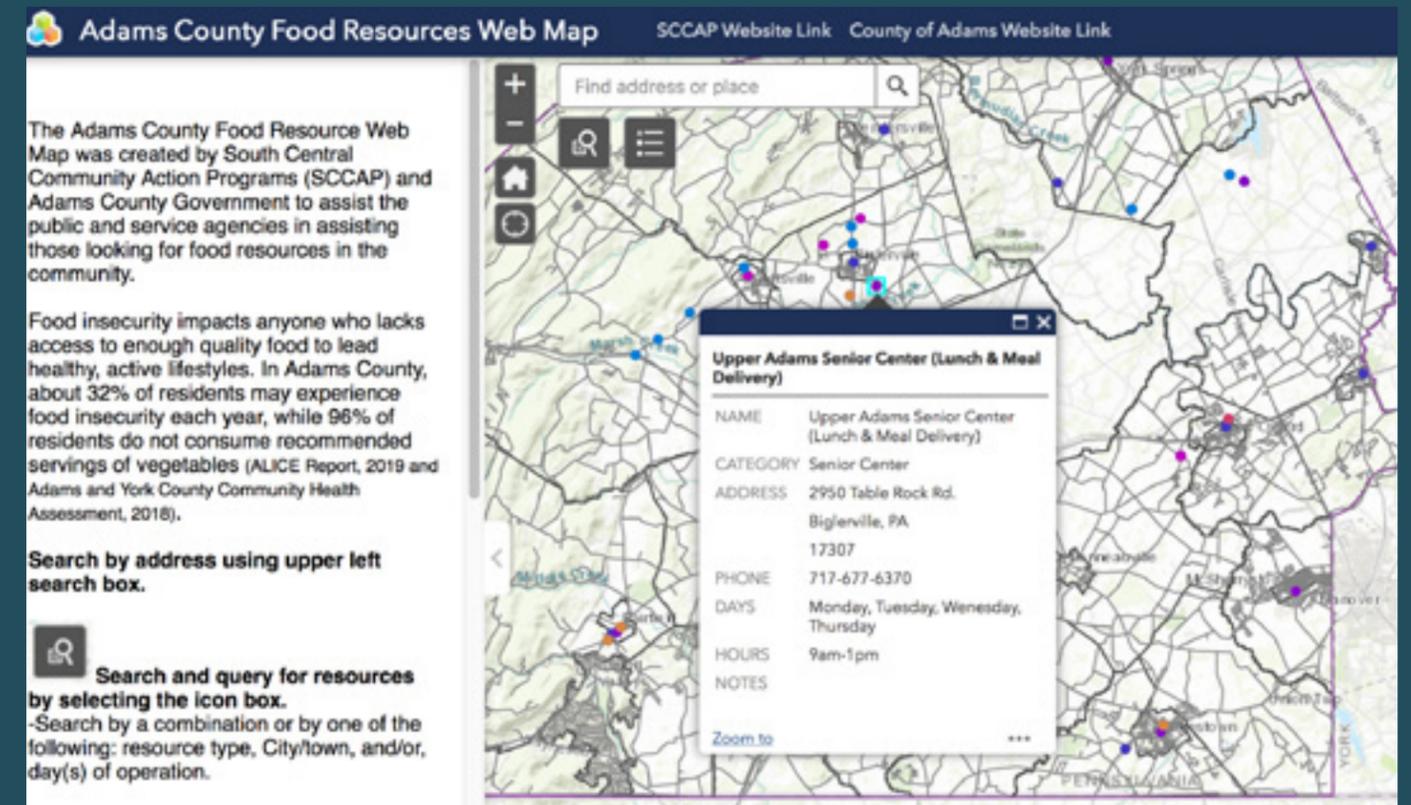


Figure 15. Adams County Food Resources Web Map showing Senior Center lunch and meal locations.

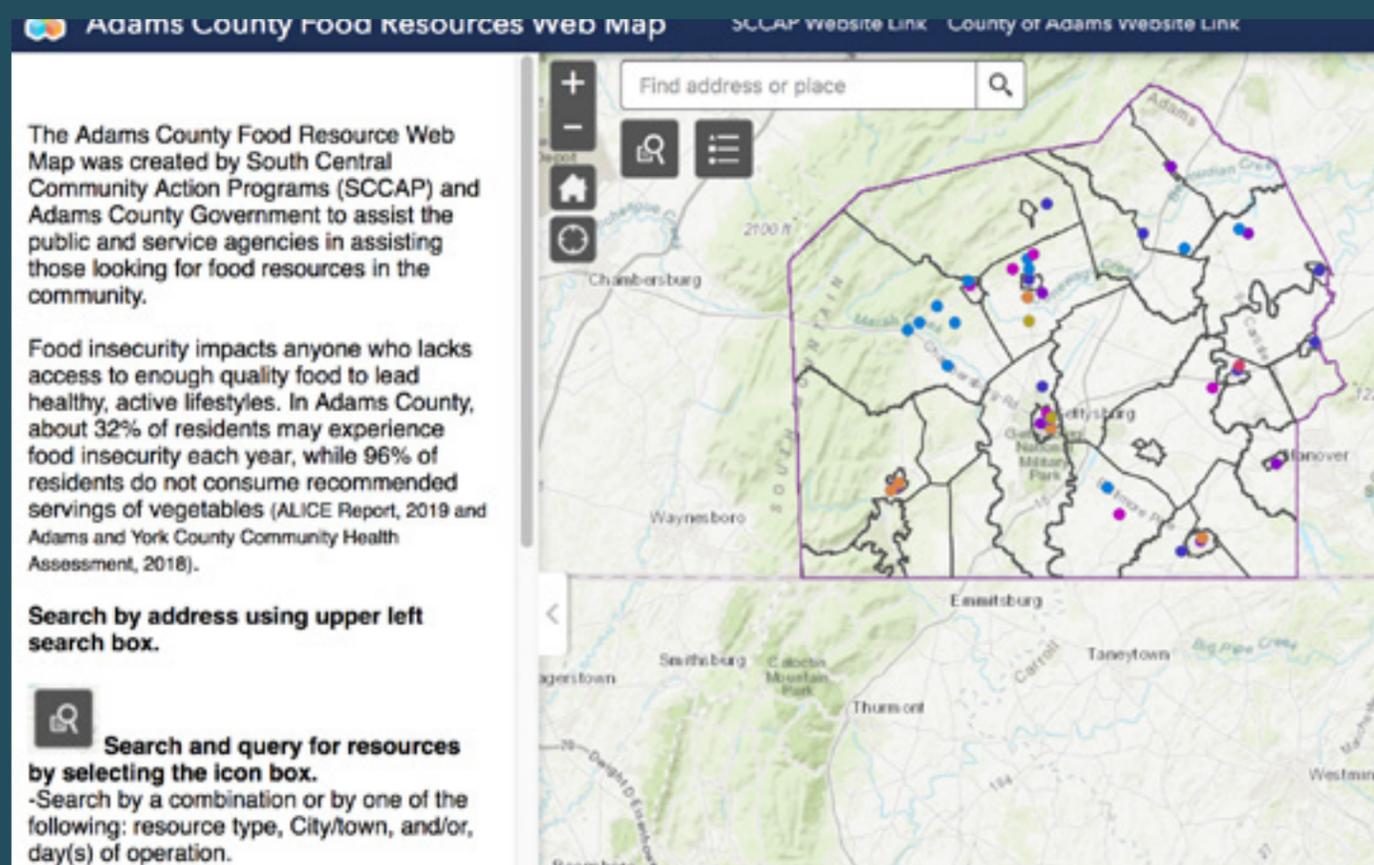


Figure 14. Adams County Food Resources Web Map.

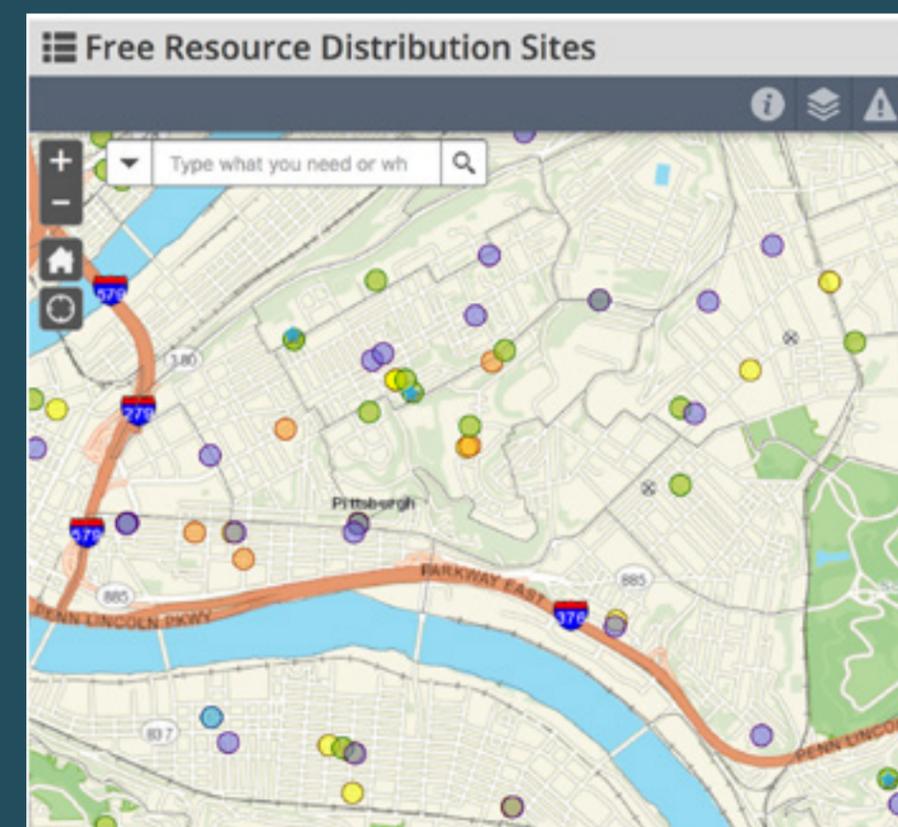


Figure 16. Allegheny County Free Food Distribution Sites

## Allegheny County

Allegheny County created a map to assist those who may be seeking free food distributions during the coronavirus pandemic. The map (Figure 16) breaks down the distributions into groups, including some that serve only students or only seniors. The map can also be filtered to include specific results. It includes:

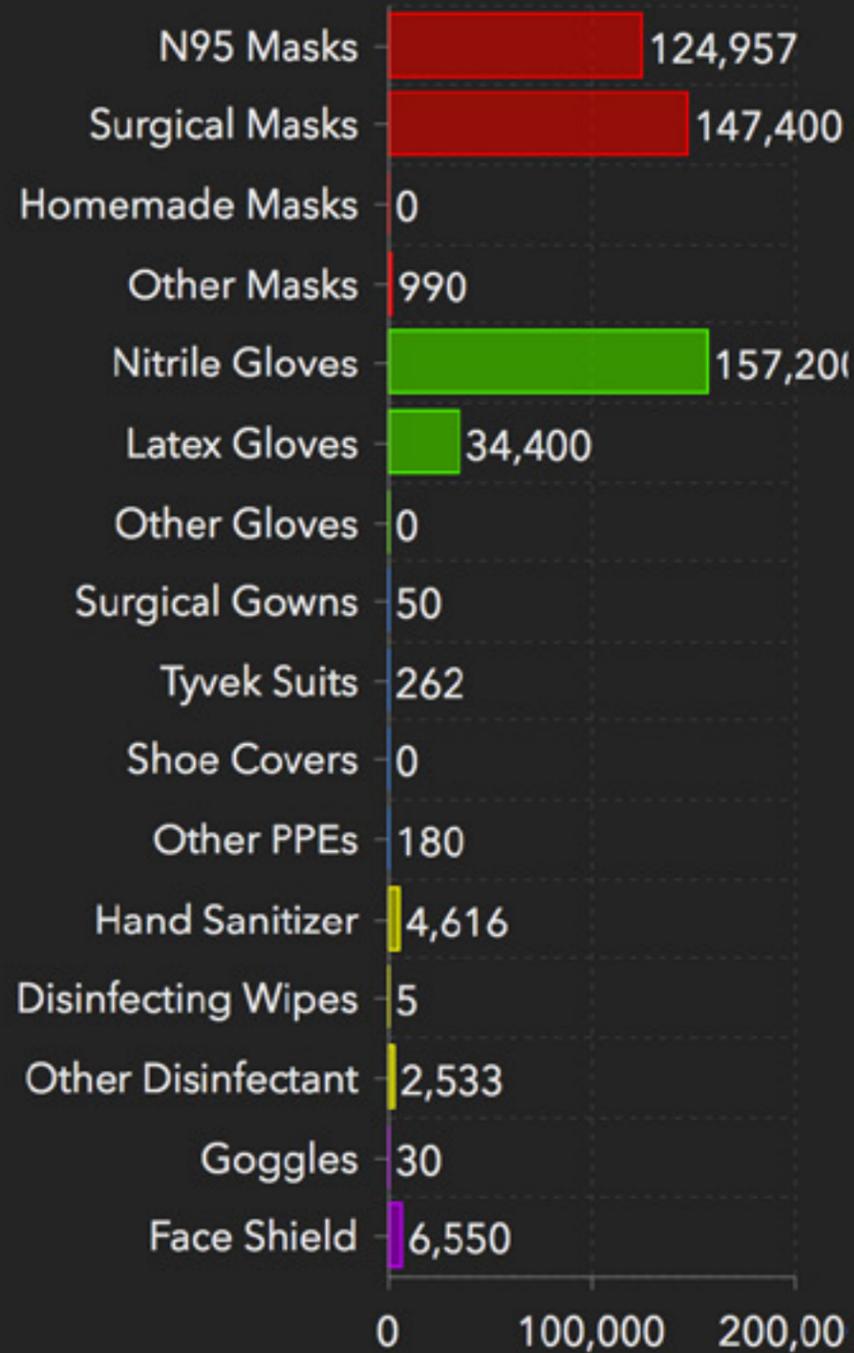
- School grab-and-go sites
- Food pantries
- Churches and other locations

The map allows a user to input their address in order to find the closest distribution point.

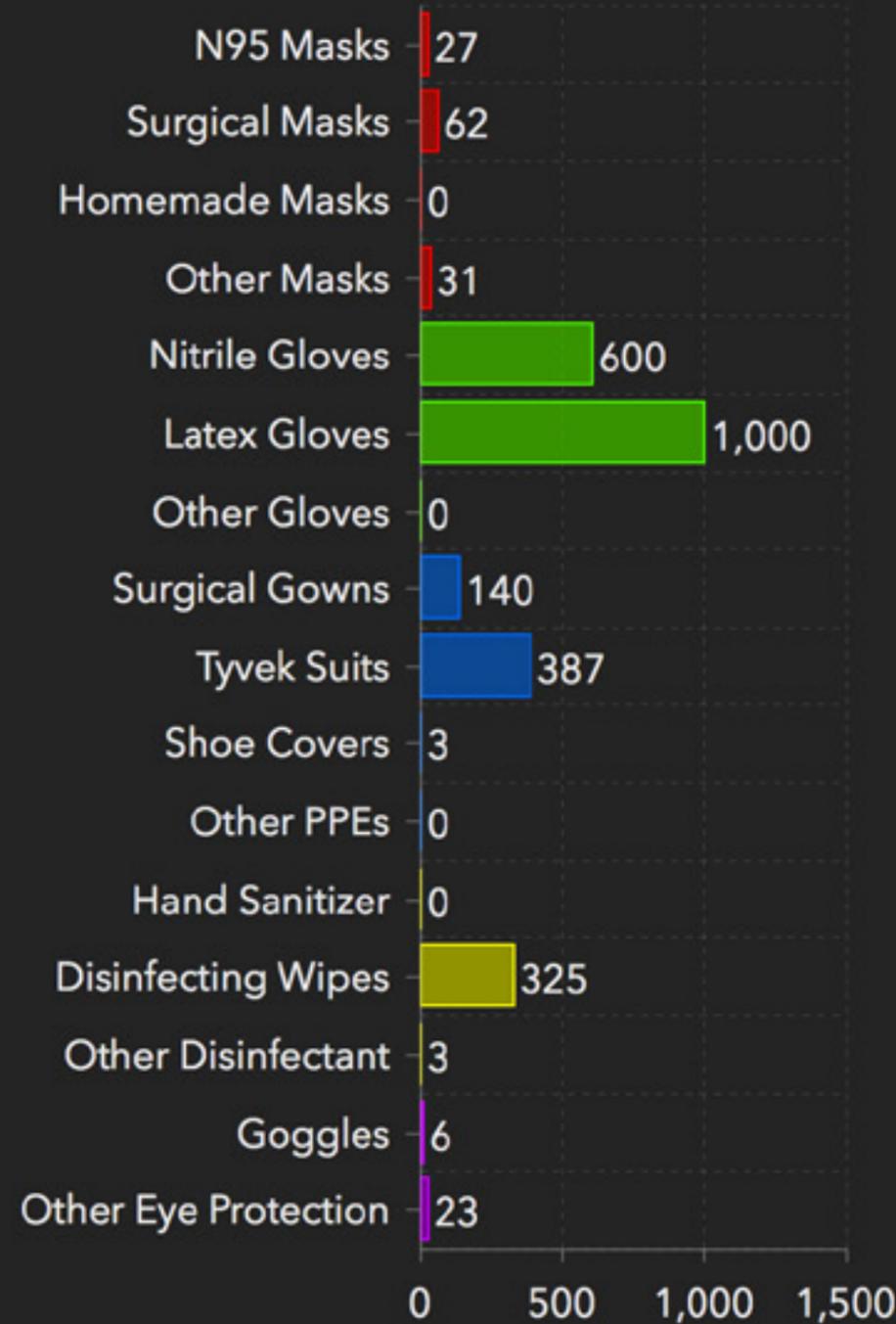
Some known locations outside of Allegheny County have also been included.

# Allegheny County COVID-19 Donation Totals

## EOC Donations



## Individual Drop-Off Donations



## DHS Donations



Figure 17. Allegheny County PPE Donation Dashboard created using Survey 123.

## Crawford county

Crawford County developed multiple resources in response to COVID-19 including an information HUB, Dashboard, surveys, and applications. One application provided information for residents to find the nearest food pantry in the county (Figure 18).

<https://coronavirus-response-crawford-county-pen-a1d00-crawfordcountypa.hub.arcgis.com/>

## Lebanon County

Lebanon County developed web maps and Dashboards that provided information about testing sites, schools providing meals, and COVID-19 impacts.

<https://lebcogis.maps.arcgis.com/home/item.html?id=180580f672544d1382b6bb745ccba441> and <https://sctf.maps.arcgis.com/apps/opsdashboard/index.html#/4e8f23dfb09e4144a391016303916e70>

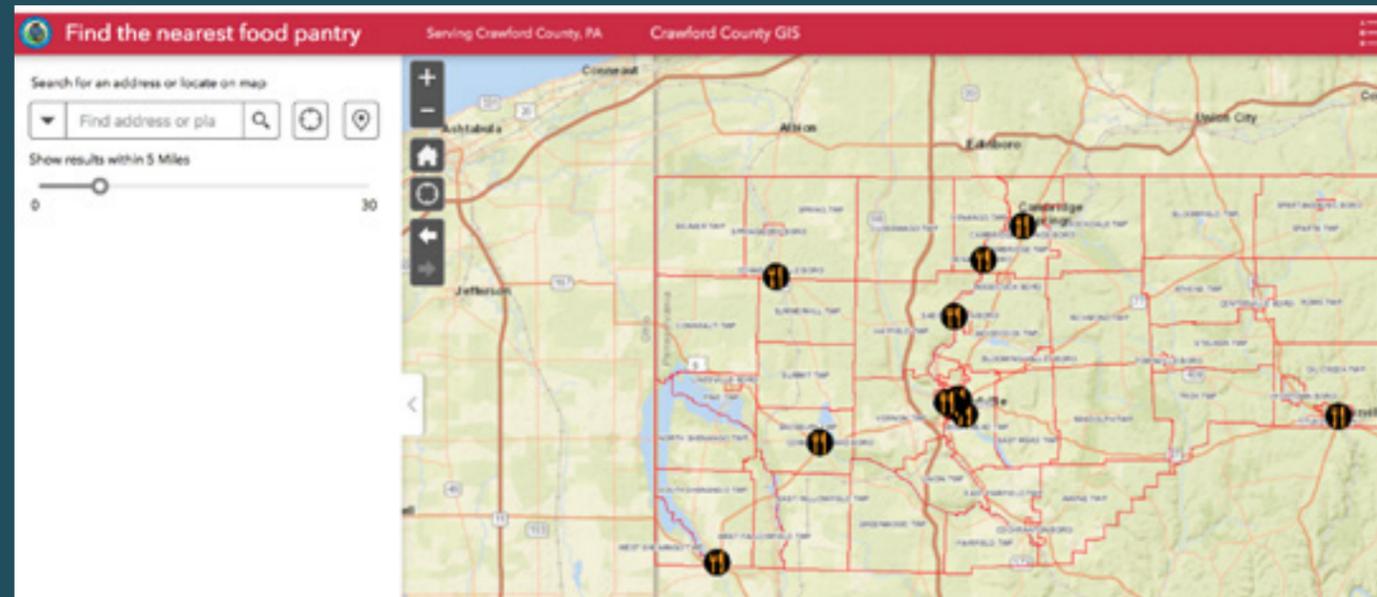


Figure 18. Crawford County Food Pantry Finder

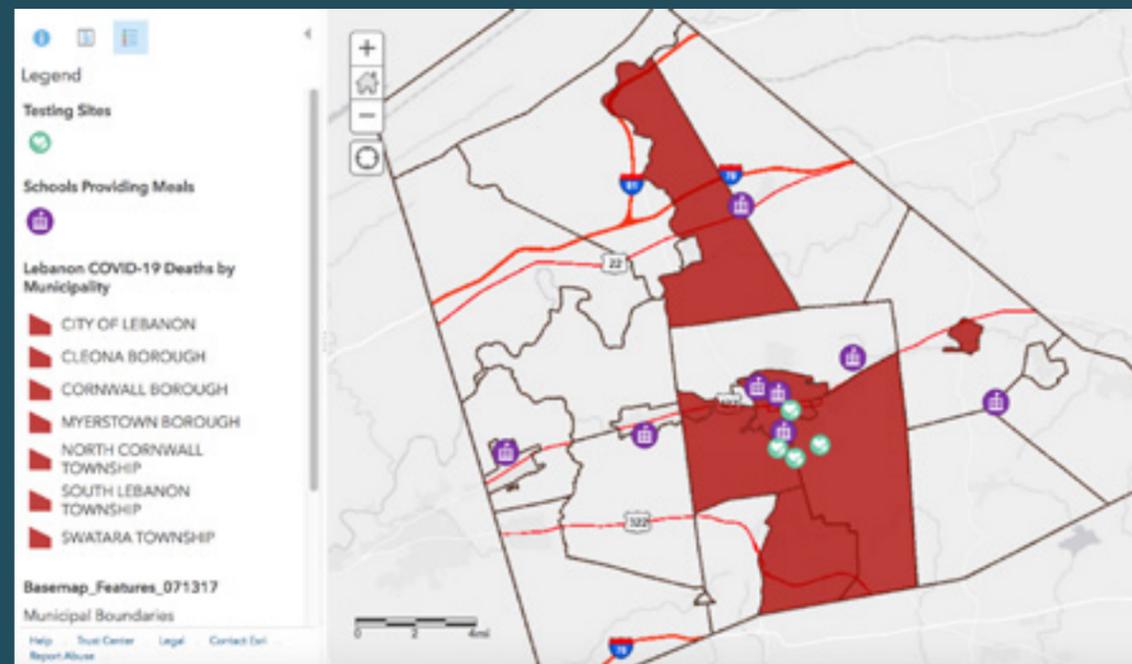


Figure 19. Lebanon County COVID-19 Information Web Map

## Monroe County

Monroe County launched a Coronavirus Response Hub that provides demographic information, business and employment information, health insurance coverage by type, hospital bed counts and other data.

<https://monroecountypa-coronavirus-hub-monroecountypa.hub.arcgis.com/>

## Montgomery County

Montgomery County launched web maps and a Dashboard showing COVID-19 cases.

<https://data-montcopa.opendata.arcgis.com/pages/COVID-19>

In addition, multiple counties in southeast Pennsylvania are working together to assess the economic impact of COVID-19 on the

region. Montgomery County developed a survey of businesses throughout the region with cooperation from other counties that will help understand impacts on businesses. Analysis of the data will be done using GIS. <sup>6</sup>

## Potter County

Using Survey 123 and the web app builder, Potter County created a web map to provide information on businesses and services that are available and open in Potter County.

<https://pottercounty.maps.arcgis.com/apps/webappviewer/index.html?id=16f3981eef4b4548957a2f926a40bd2c>



Figure 20. Monroe County COVID-19 Response Hub.



## Tioga County

Tioga county used GIS to understand telecommunications access and coverage for students in the county's school districts. The county created population density maps, analyzed wireless coverage, and geocoded information to create heat maps for locations and coverage.

## Union County

Union County created a web map showing cases of COVID-19, updated daily for Union and Snyder counties.

## Washington County

Washington County's GIS Department and Human Services developed a Story Map to provide awareness of food distribution opportunities, which can be updated through a Survey123 form.

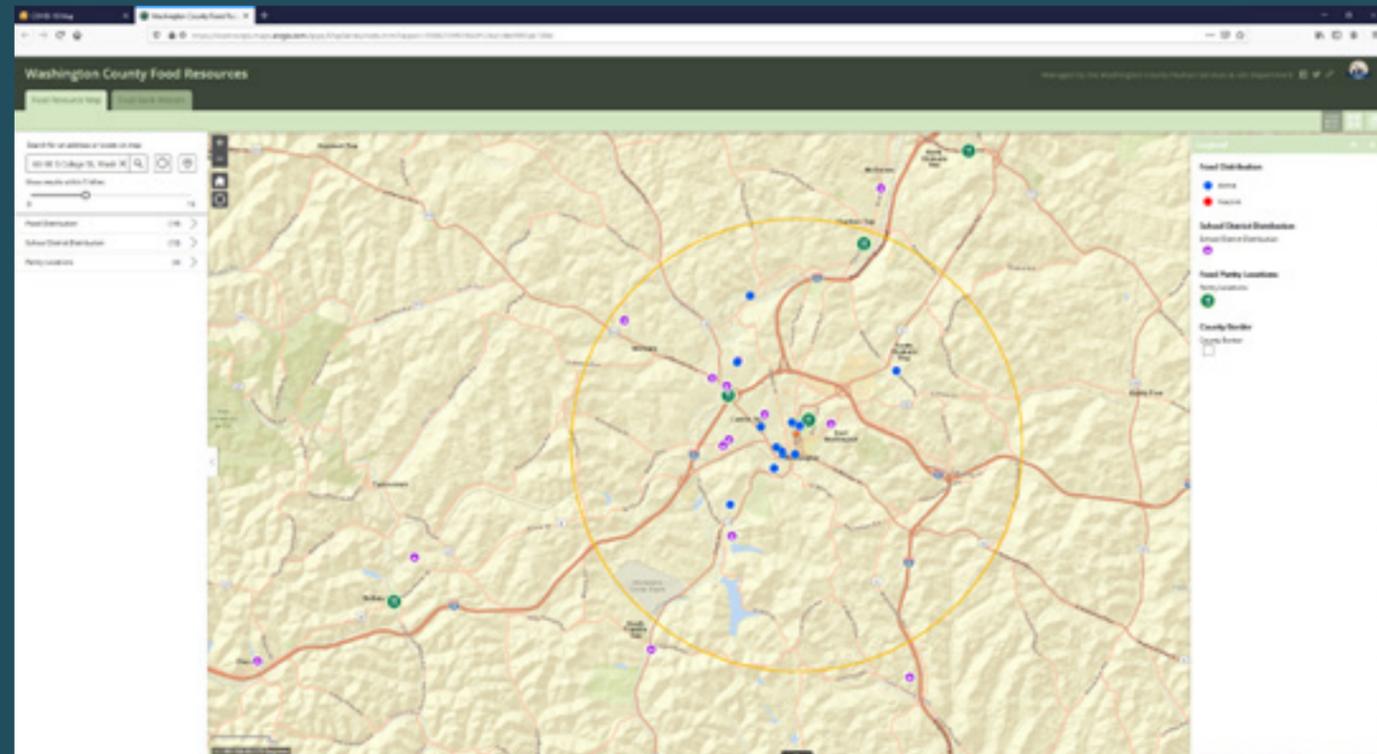


Figure 25. Washington County Story Map of Food Resources as of 6/10/20.

Washington County's Department of Public Safety developed a dashboard to display regional COVID-19 information. WCDPS COVID-19 Dashboard Link

## York County

York County created several applications and a Dashboard in response to COVID-19. One of the applications was a Recreational Viewer which showed the public recreational opportunities available near them including amenities and links to social distancing guidelines.

<https://yorkcountypa.maps.arcgis.com/apps/webappviewer/index.html?id=a3e7724757c4411b9a735112ca6f681f>

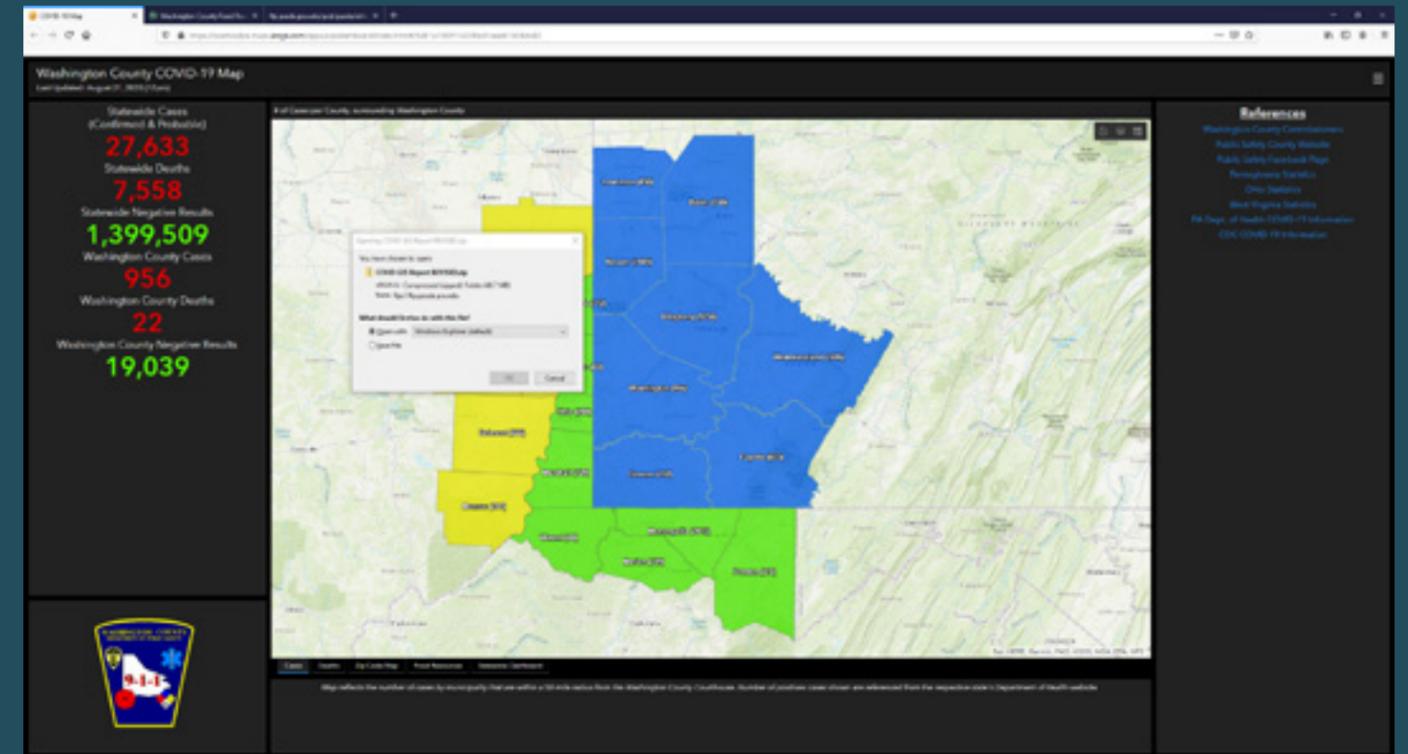


Figure 26. Washington County COVID-19 Dashboard.



Figure 27. York County Recreational Viewer as of 9/4/20

# GREATER PHILADELPHIA BIKE MATCH

The Delaware Valley Regional Planning Commission is connecting our first responders, medical professionals and essential workers on the front lines with free bikes during the COVID-19 pandemic.

[LEARN MORE](#)

[I Need A Bike](#)

[I Have A Bike](#)

Figure 28. DVRPC Bike Match.

## Delaware Valley Regional Planning Commission

To address the need for transportation when public transportation might not be a positive alternative, the Delaware Valley Regional Planning Commission (DVRPC) worked to assist essential workers and those caring for others to share in the opportunity to bicycle to their activities. DVRPC partnered with Bike Match cities to connect people who have an extra bike in ready-to-ride condition with others who need one in a contactless match through [#GreaterPHLBikeMatch](#). Users would just submit the Have a Bike or Need a Bike form on the Bike Match site and be matched with a bike based on their location.

## South East Pennsylvania Task Force (SEPA Task Force0

SEPA created a data Hub and Dashboard that included data from Chester, Delaware, Bucks, Montgomery, and Philadelphia County Health Departments as well as information from the Pennsylvania Emergency Management Agency, in conjunction with the Pennsylvania Department of Health PA NEDSS.

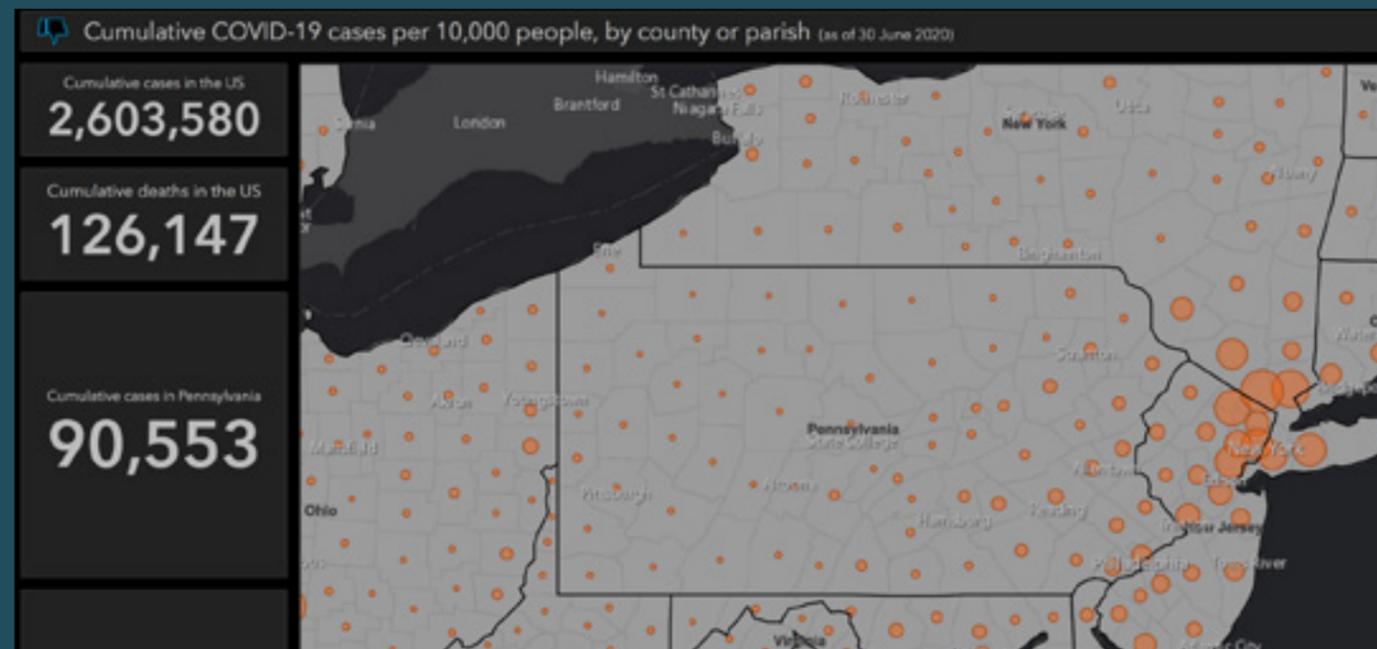


Figure 29. Shippensburg University Student Dashboard

# Academic Institutions

## Shippensburg University

Shippensburg University provided their students with an opportunity to study the pandemic and use GIS to build a Dashboard. The goal was to help students understand how GIS can be used to develop and refine a workflow for updating the dashboard daily and efficiently. This gave students a chance to take ownership of the situation and exert some measure of control over one aspect of the pandemic, which otherwise they had no control over.

<https://arcg.is/0b1bz80>

## Carnegie Mellon

Carnegie Mellon University created COVIDCast an interactive map that displays real-time information on symptoms, doctor visits, medical tests, and browser searches related to COVID-19.

## Business

GeoDecisions created a Southeast Pennsylvania COVID-19 Trends Dashboard for counties in that region.

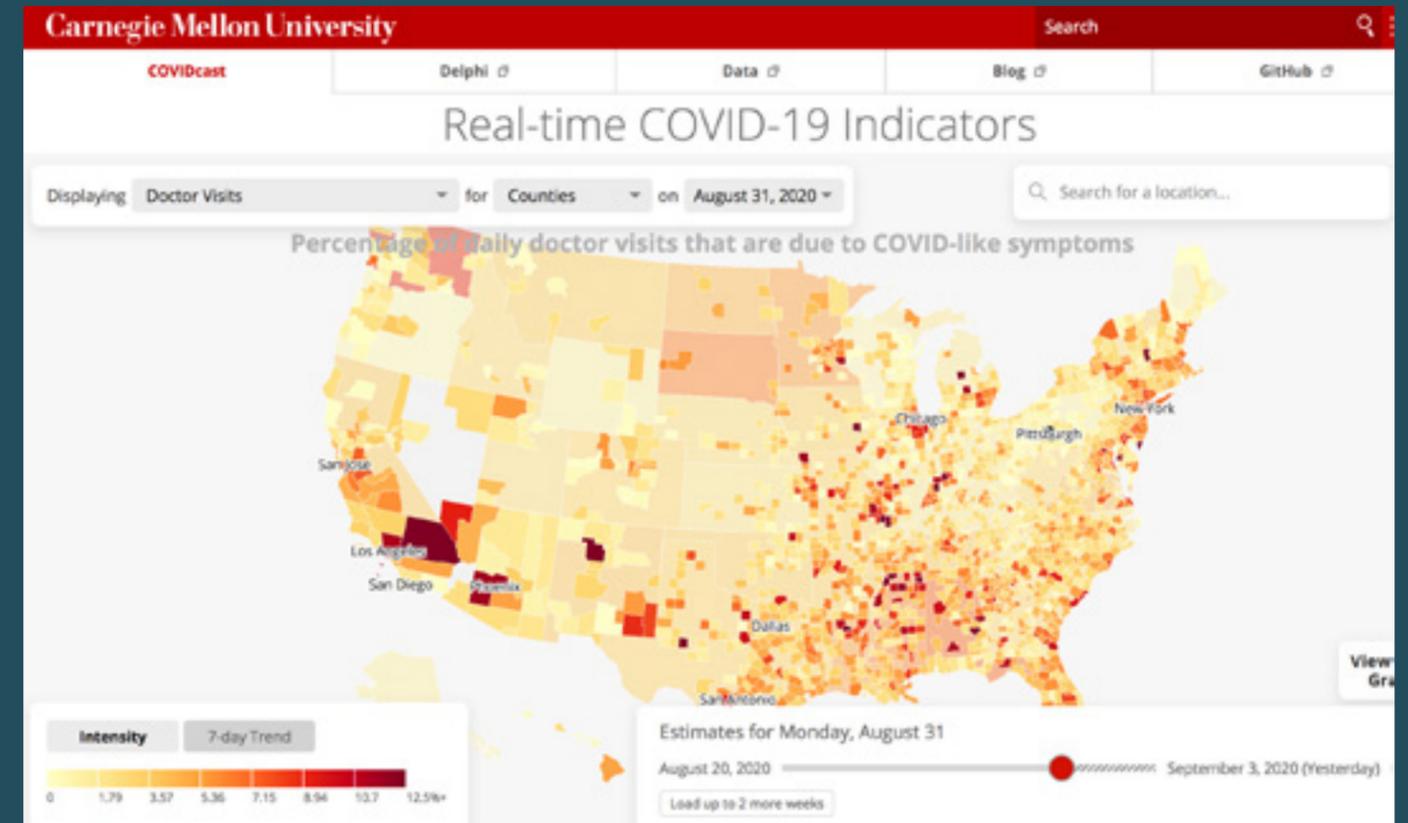
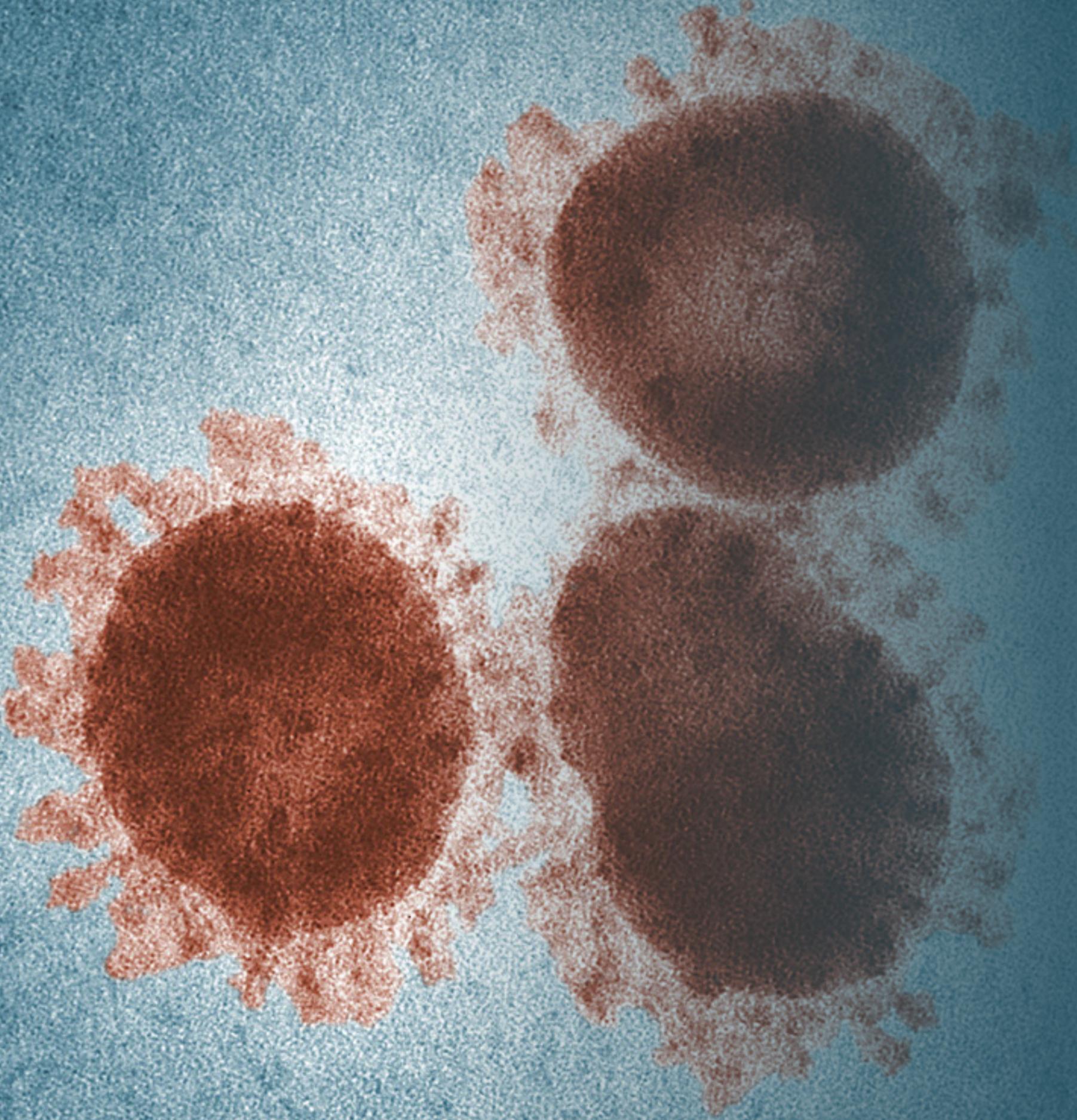


Figure 30. Carnegie Mellon COVIDCast as of 9/4/20



Figure 31. GeoDecisions County Dashboard



## Sources:

1. Wolf Administration Confirms Two Presumptive Positive Cases of COVID-19. Retrieved from: <https://www.governor.pa.gov/newsroom/wolf-administration-confirms-two-presumptive-positive-cases-of-COVID-19/>
2. National States Geographic Information Council. Retrieved from <https://www.nsgic.org/about>
3. Joint Statement on the Value of GIS in the Pandemic. Retrieved from <https://nsgic.memberclicks.net/joint-statement-on-the-value-of-gis-in-the-pandemic>
4. Montgomery county mapping economic impact. Retrieved from <https://www.esri.com/about/newsroom/blog/COVID-19-pennsylvania-counties-assess-economic-fallout/>
5. Map shows how many hospital beds, ventilators Pennsylvania has available in each county, TribLive. Retrieved from <https://triblive.com/news/pennsylvania/map-shows-how-many-hospital-beds-ventilators-pennsylvania-has-in-each-county/>
6. COVID-19: Pennsylvania Counties Assess Economic Fallout with Shared Maps. Retrieved from <https://www.esri.com/about/newsroom/blog/COVID-19-pennsylvania-counties-assess-economic-fallout/>

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