COVID-19 Vaccination in Cincinnati

Epidemiology Data Brief

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city of CINCINNATI HEALTH DEPARTMENT

Issue 5

What We Know

Researchers believe COVID-19 is spread through droplets and very small particles that contain the virus. These droplets and particles are released when an infected person breathes, talks, laughs, sings, coughs, or sneezes. Larger droplets may fall and contaminate surfaces, while smaller particles can linger in the air and accumulate in indoor spaces, especially with poor ventilation.[1]

One becomes infected with COVID-19 when the droplets enter their body. This can happen by breathing in air that has droplets and particles that contain the virus, or having droplets or particles come in contact with eyes, nose, or mouth. [2]

Symptoms of COVID-19 show up within 2 to 14 days following exposure to the virus. Once a person is infected, they are able to spread to others for up to 2 days before symptoms appear, and can remain contagious to others for 10 to 20 days, depending on the individual's immune system and the severity of the illness. [2]

Common symptoms of a COVID-19 infection include: loss of sense of taste or smell, fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, headache, sore throat, congestion or runny nose, nausea or vomiting, and diarrhea. While some individuals will develop no symptoms, severe cases of COVID-19 can lead to hospitalizations, respiratory failure, long-term lung or heart muscle damage, nervous system problems, kidney failure, or death. Long COVID describes the presence of symptoms weeks or months after recovering from COVID-19. Long COVID symptoms can include of long term fatigue, breathlessness, cough, chest pain, heart palpitations, organ damage, headache, joint pain, weakness, insomnia, numbness, diarrhea, rash or hair loss, impaired balance, neurocognitive issues including memory and concentration and worsened quality of life. [1-4]

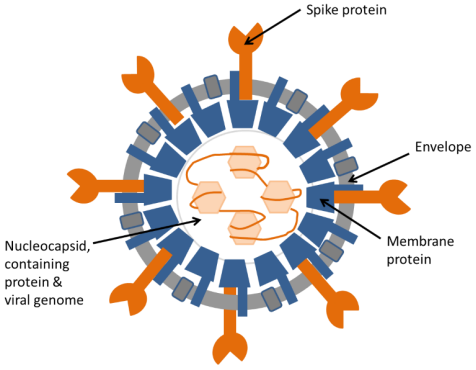
According to the Centers for Disease Control and Prevention, to maximize protection from the COVID-19 virus an individual should implement as many of the following layers of preventive measures as possible: get vaccinated, wear a mask, avoid or limit time in crowded or poorly ventilated spaces, stay 6 feet away from others, wash hands often, cover cough and sneezes, clean and disinfect all high touch surfaces daily, and monitor personal health daily. [5-6]

As of December 31st, 2021, 46,021 cases associated with COVID-19 have been reported in the City of Cincinnati. Of these reported cases, 2,268 have been hospitalized and 537 have died. [7]

A new kind of coronavirus identified in 2019, called SARS-CoV-2, has caused a pandemic of an infectious respiratory disease called COVID-19. Coronaviruses are a family of viruses named for their appearance. "Corona" meaning "crown," refers to the virus's outer layer, which is covered in spike proteins that surround the virus like a crown. These spike proteins act as a key and allow the virus to enter healthy cells causing infection. [1-3]

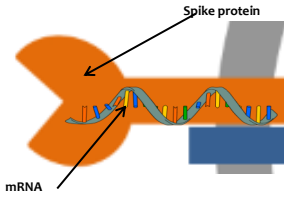
How the COVID-19 Vaccines work

A vaccine helps teach the body to make antibodies against a disease before that person comes in contact with the disease. Antibodies are part of the immune system and act as guards protecting the body from foreign invaders such as viruses and bacteria. Antibodies exist in the bloodstream and are circulated throughout the body. Antibodies work to neutralize and destroy viruses and bacteria, which can prevent or minimize illness. [8-9]



There are two types vaccines on the market in the United States to help combat the spread of COVID-19; mRNA and viral vector vaccines. There are two mRNA vaccines, the Pfizer BioNTech also called "Comirnaty" and the Moderna vaccine. Johnson and Johnson's Janssen vaccine is a viral vector vaccine. None of vaccines on the market in the United States contain the COVID-19 virus, meaning the vaccines cannot cause someone to be infected with the COVID-19 virus. [8-9]

mRNA Vaccines



mRNA vaccines use the isolated genetic code (mRNA) from the spike proteins of the COVID-19 virus. This genetic code contains instructions on how to build new spike protein keys without the harmful COVID-19 virus. The mRNA vaccine contains these mRNA instructions that our bodies can read to build new spike proteins. Once the body builds these spike proteins the immune system responds by making specialized antibody guards that recognize the spike protein keys as invaders and begins to destroy them. As the body fights, it is learning how to make more antibodies that recognize spike proteins and the process of fighting them. Once the vaccine helps teach the body how to fight the virus so if it ever becomes exposed to the spike protein covered COVID-19 virus, the body is prepared to fight the virus. [8-10]

Viral Vector Vaccines

A viral vector vaccine uses a modified, harmless version of a different virus called a "vector". In the COVID-19 vaccine the vector shares the same outer layer of spike protein keys on it. Once the vector enters the body it teaches the body to make copies of the harmless spike protein and immune system starts to react. The immune system begins to make specialized antibody guards that recognize the spike protein keys created by the body as invaders and begins to destroy them. The vaccine helps teach the body how to make antibody guards to protect itself from the COVID-19 virus in the future. [8-11]

Vaccines are Effective in Reducing Hospitalizations and Deaths due to COVID-19

Hospitalization of those unvaccinated from January 1st, 2021-December 31st, 2021

44,406 in Ohio

1,085 in Cincinnati

Deaths of those unvaccinated from January 1st, 2021-December 31st, 2021

13,327 in Ohio

270 in Cincinnati

Hospitalization of those fully vaccinated January 1st, 2021– December 31st, 2021

2,652 in Ohio

67 in Cincinnati

Deaths of those fully vaccinated January 1st, 2021–December 31st, 2021

646 in Ohio

6 in Cincinnati

* Above data pulled from Ohio Data Warehouse [7], and Ohio Covid Dashboard (January 22, 2022). Data is provisional and subject to change.

What Does this Tell Us?

Vaccines work! According to the Ohio Department of Health, the number of deaths and hospitalized cases of COVID-19 are significantly lower in those who are considered fully vaccinated. To be considered fully vaccinated by the CDC, one must have received two doses of an mRNA vaccine (Moderna or Pfizer BioNTech) or one dose of Janssen's Johnson & Johnson vaccine. Being fully vaccinated is not 100% effective at preventing COVID-19 infection but is highly effective at preventing hospitalization and death. [12]

According to the CDC's Morbidity and Mortality Weekly Report (MMWR), COVID-19 cases in the United States from October to November 2021, when the Delta variant was the dominant strain case rates were lowest among fully vaccinated individuals with a booster dose at a rate of 25 cases per 100,000 people in the population, compared with fully vaccinated individuals without a booster dose (88 per 100,000), and was much lower then rates among unvaccinated individuals (348 per 100,000) from October to November 2021. During this time, unvaccinated persons were 13.9 times more likely to get a COVID-19 infection and 53.2 times more likely to experience COVID -19 associated death than fully vaccinated persons who received booster doses; and 4.0 and 12.7 times more likely then individuals who were fully vaccinated without a booster dose, respectively. In December 2021 with the rise of the omicron variant, vaccinated individuals with a booster (149 per 100,000) still had lower rates then individuals who were vaccinated without a booster (255 per 100,000) and much lower then those who were unvaccinated (726 per 100,000). [13]

Standardized Incidence of COVID-19 Cases and Deaths in the US from April to December 2021

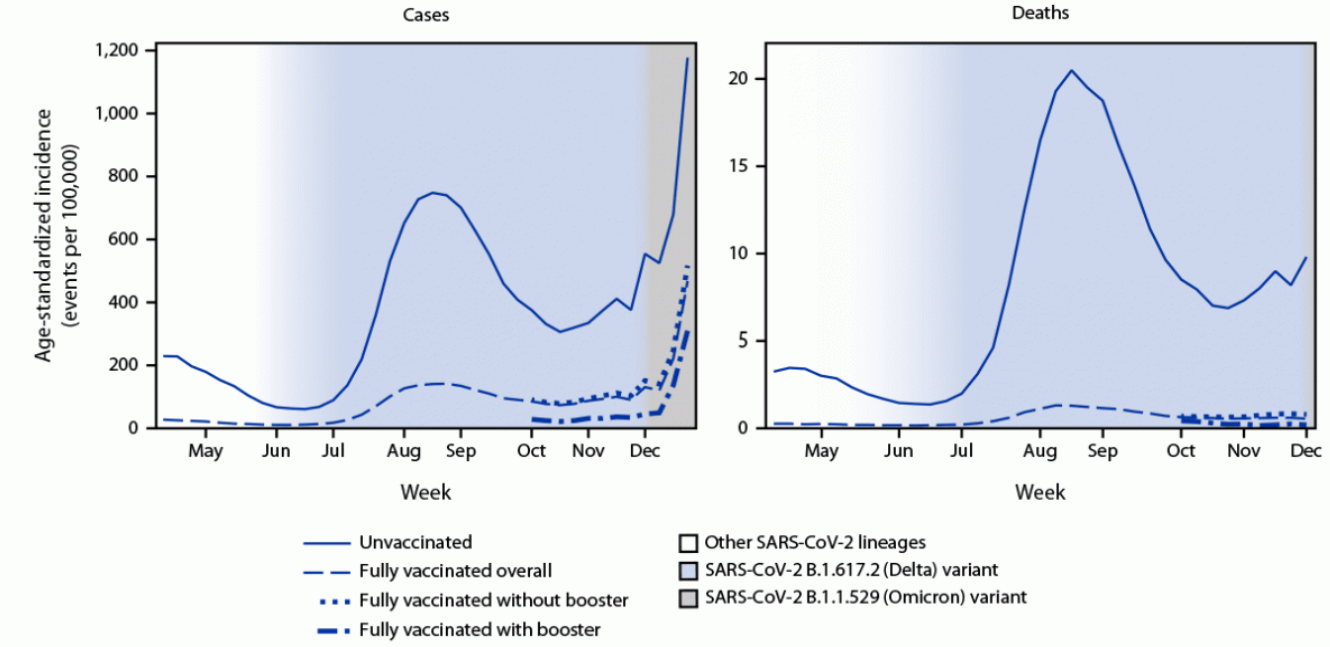
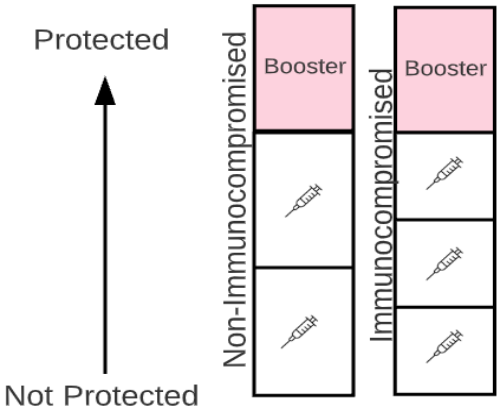


**Figure 1. Standardized incidence of COVID-19 cases from April 4th– December 25th, 2021 and deaths from April 4th– December 4th, 2021 for unvaccinated compared with fully vaccinated persons overall and by receipt of booster doses and national weighted estimates of variant proportions across 25 U.S. jurisdictions. [13]

*Note the increase in cases and deaths for August– October 2021, can be attributed to the emergence of the Delta Variant of COVID-19. Due to its more contagious nature, those who have been vaccinated still have the chance to get COVID-19 as well as spread it to others. However, it has been reported that vaccinated individuals will not get as sick or stay symptomatic as long as those who remain unvaccinated.

Vaccine Schedule

Ohio's Vaccination Program was a phased approach based on limited number of vaccine supply each state was given when vaccines were first distributed in December of 2020. As of September of 2021, Ohio has entered a stage in which vaccines are widely available to any resident 5 years of age or older who wishes to receive it. An individual is considered fully vaccinated 2 weeks after completing their primary series. To be considered up-to-date on vaccinations one must receive a booster dose. Boosters are available for individuals 12 years of age or older who are 5 months after their second dose of an mRNA vaccine or 2 months after their Johnson and Johnson vaccine. A second booster is recommended for adults over 50 years old and immunocompromised individuals 4 months after their first booster. The COVID-19 boosters are given to restore and ensure a high level of protection against the COVID-19 virus in patients, as the protection of any vaccine decreases over time. [14-15]



What if I'm immune-compromised?

A third dose of the primary series of the Moderna or Pfizer BioNTech vaccine or a second dose of the Johnson & Johnson vaccine is recommended for those who are immunocompromised, so that they reach the same high level of protection that is given by the original two doses in non-immunocompromised patients. For improved protection overtime, immunocompromised individuals should stay up-to-date on their booster doses. [14-16]

Vaccines in Cincinnati by the Numbers

Community Efforts

According to the 2020 census, Cincinnati is a city of 303,940 individuals. At this time COVID-19 vaccinations are only available to those age 5 years and older, making only 282,360 Cincinnatians eligible. The Cincinnati Health Department (CHD) has been a key provider of COVID-19 vaccinations for Cincinnati residents and with the help of local hospital systems, healthcare providers, pharmacies and other local health departments 67.4% of all Cincinnati residents have been vaccinated as of December 31st, 2021. [17-18]

December 22, 2020 - December 31, 2021

67.4% Vaccinated

All City of Cincinnati Residents (Including ineligible residents)

204,712 / 303,940

December 22, 2020 - December 31, 2021

72.5% Vaccinated

All Eligible City of Cincinnati Residents (Residents above 5 years of age)

204,712 / 282,360

Cincinnati Health Department Efforts

Vaccination efforts began for CHD December 22nd, 2020 and as of December 31st, 2021 the Cincinnati Health Department has given 96,851 doses to 52,166 individuals. Of those recipients, 25,396 of them have been identified as City of Cincinnati residents.

December 22, 2020 - December 31, 2021

8.35% Vaccinated

All City of Cincinnati Residents (Including ineligible residents) were vaccinated by the Cincinnati Health Department

25,396 / 303,940

December 22, 2020 - December 31, 2021

8.99% Vaccinated

All Eligible City of Cincinnati Residents (Residents above the age of 5 years of age) were vaccinated by the Cincinnati Health Department

25,396 / 282,360

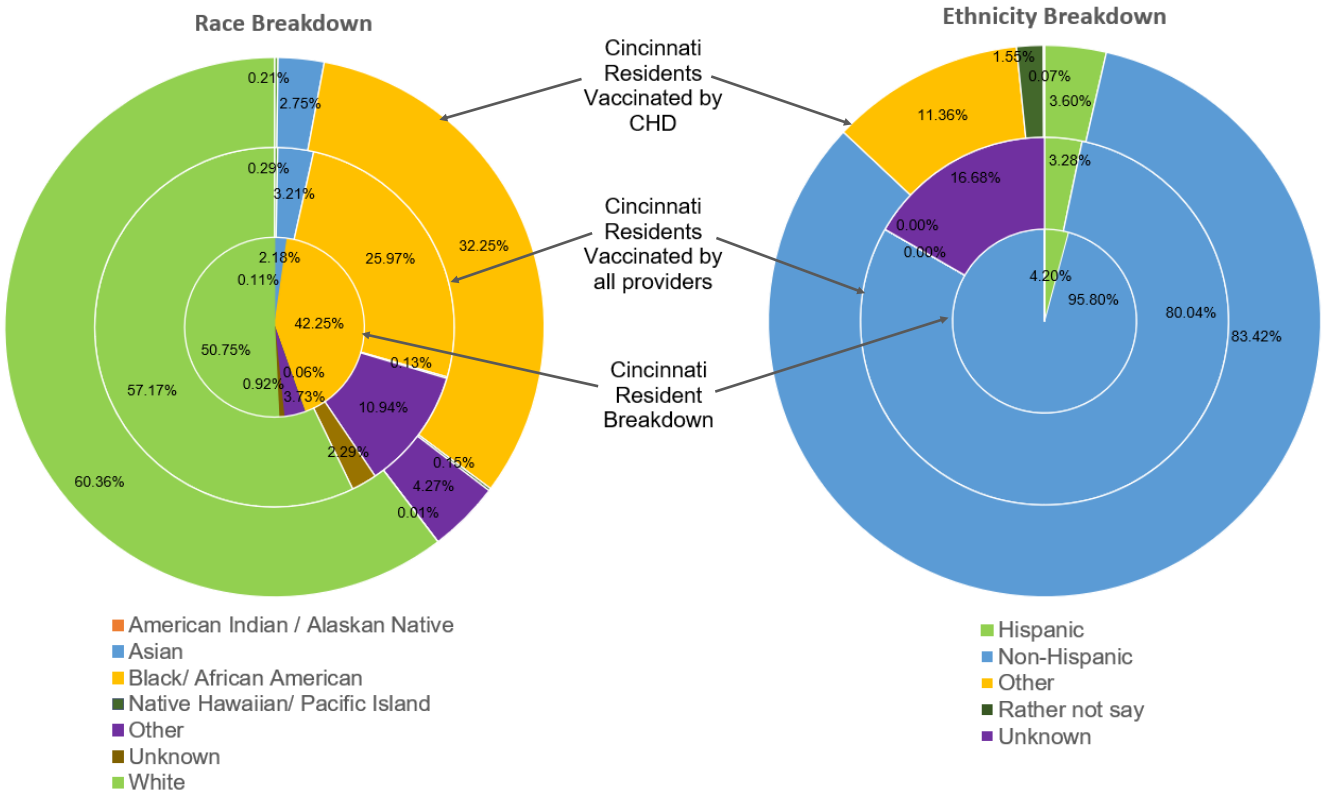
Demographic breakdown of Vaccine Recipients

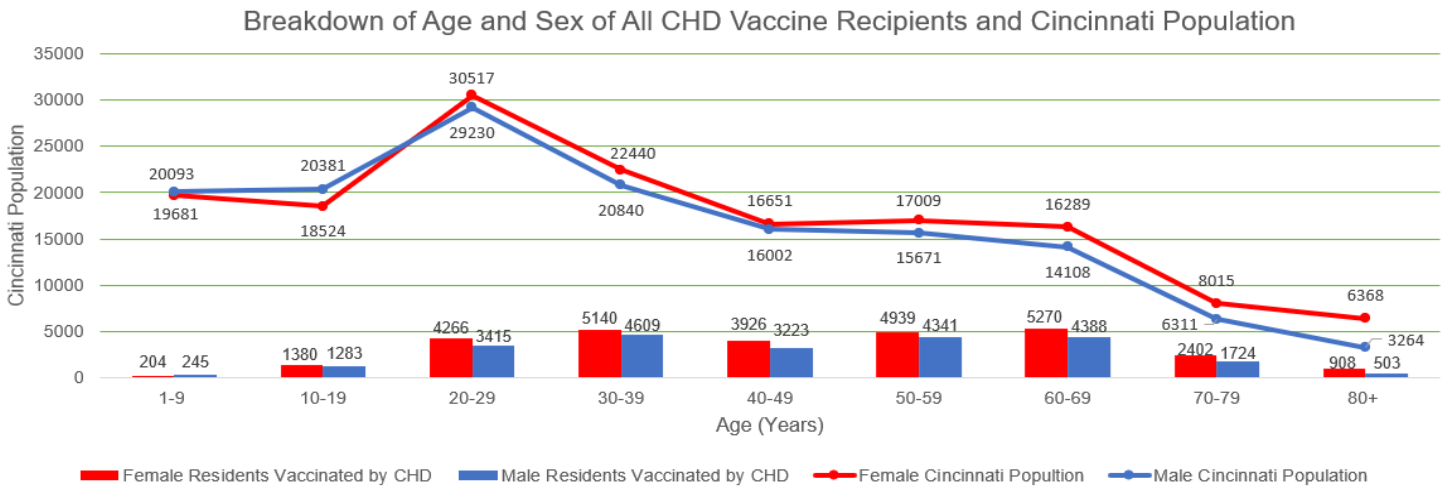
Cincinnati is a diverse community of 303,940 individuals. Overall, Cincinnati Health Department has given 96,851 doses to 52,166 individuals between December 22, 2020 and December 31st, 2021. Of those 52,166 recipients, 25,396 (48.68%) were identified as City of Cincinnati Residents.

In our effort to make Cincinnati a safer and healthier city against the global public health threat of COVID-19, we looked at the community we serve and the individuals we vaccinated, to better focus vaccination efforts in low vaccine uptake populations. From our demographic breakdown analysis of vaccine recipients we can see that our vaccine initiative has been extensive. CHD as a single provider has vaccinated 8.35% of all Cincinnati residents.

Cincinnati Population	Cincinnati Residents Vaccinated by all Providers	Cincinnati Residents Vaccinated by CHD
n= 303,940	n= 294,712	n= 25,396

CHD is seeing similar demographic vaccination trends to the rest of Ohio and National CDC numbers. The graphic below compares the demographic breakdown of CHD's vaccination efforts to the demographic breakdown of all Cincinnati residents and the vaccination efforts of other local providers. A good vaccination initiative is equitable to all residents and should be a sample of the entire population; mimicking the demographic distribution. CHD is recording lower vaccination rates among black individuals than other races, which is in line with national reporting. Though only 32.3% of vaccines given by CHD were to black residents, 42.3% of Cincinnati residents are black. Looking at city wide data the discrepancy is more stark, as of December 31st 2021, only 41.4% of black residents were vaccinated, in contrast to 74.4% of white residents. Similarly, we see lower vaccine uptake in younger age groups. [19]





Percent of Hamilton County Residents Vaccinated by Zip Code as of Dec. 28, 2021

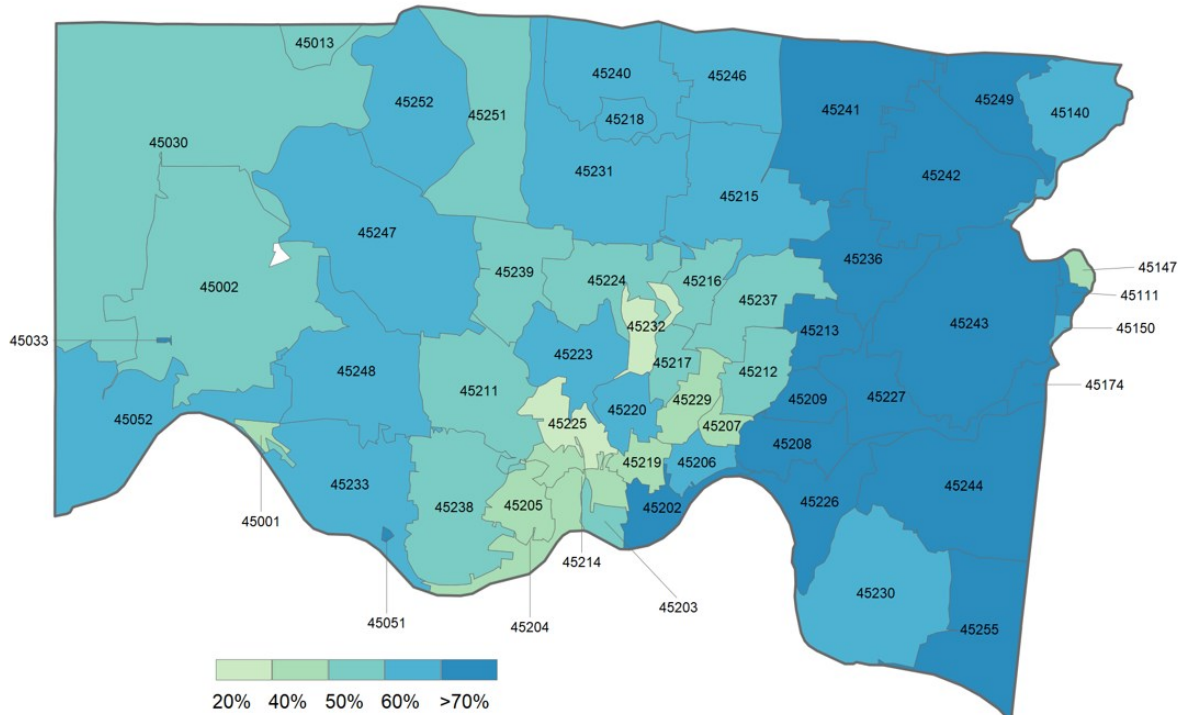


**Figure 2 pulled from the Health Collaborative Situational Dashboard from December 28, 2022 [20]

Fighting For Equity

The Cincinnati Health Department is dedicated to the mission of ensuring access to quality services and improving community health and wellness by upholding the core values of collaboration, commitment, accountability, quality and, health equity & access to our residents. In our efforts to serve all our Cincinnati residents, CHD has worked to remove barriers to vaccine access:

Locations

- Provided vaccines at 835 vaccination clinics at 121 different site locations including schools, recreation centers, churches, shelters, jails, community events in addition to public mass vaccination sites throughout the city.
- Provided vaccines 319 out of 374 days from December 22, 2020 to December 31, 2021.

Transportation

- Offered free transportation services through partnerships with United Way and The Cancer Justice Network. *
- Eliminated cost of parking at all vaccine locations. *
- Partnered with the Cincinnati Fire Department to provide vaccination services to homebound residents through the Council on Aging.
- Offered accessibility options including wheelchairs and mobility assistance staff. *

Communication

- Provided Emergency Use Authorization (EUA) information and vaccine resources to individuals in languages such as English, Spanish, Chinese, Vietnamese, French, Arabic, Japanese and Portuguese. *
- Utilized multilingual staff, volunteers and translators to improve understanding. *
- Connected with community partners such as Santa Maria Community Services and Su Casa to provide vaccinations at local events.

Information

- Worked to make all information about the vaccines clear and available.*
- Provided vaccine information and registration resources in person and online at Vaccine Information & Sign-up - Health (cincinnati-oh.gov). *
- Staffed a COVID-19 call center at 513-357-7462 to answer general questions and register for vaccines over the phone.*

CHD worked to meet vaccine demand by scaling the size of the clinic operations. Availability of appointments were determined by available staff, size of location, vaccine inventory, and supplies. CHD maintained a regular vaccine schedule Monday through Saturday and occasionally Sundays at our CHD main office at 3101 Burnet Ave and moved our daily vaccine site to Duke Energy Convention Center to accommodate large volumes of recipients as vaccine demand grew; scaling back to our Burnet Ave office as demand declined in the summer months. Our CHD staff averaged 304 doses given per day with our largest day reaching 4,176 vaccines given on April 6th, 2021 (See Appendix B).

*Indicated ongoing efforts

Vaccine Hesitancy in Cincinnati

CHD has been working to address vaccine hesitancy in our community. With the help of our partners at Cohear, a Cincinnati based community engagement and strategy company, we were able to gain insight into local perspectives on vaccination using six focus groups (n=50).[20]

This study highlighted seven sources of vaccine hesitancy:

1. **Mistrust of the healthcare system for both historical and experimental reasons**
2. **The speed at which vaccines were developed and approved**
3. **The fact that people are being incentivized to take it**
4. **The perceived lack of transparency around the vaccine ingredients and effects**
5. **The focus on Black and minority communities**
6. **A reaction to feeling condescended to or not taken seriously**
7. **Fear of getting sick from the vaccine's side effects and missing work**

In order to meaningfully engage populations that are wary of the vaccine, CHD took steps to address those hesitancies. CHD worked to build meaningful relationships in our community by working with trusted voices such as faith leaders, local outreach groups, and health advocates, and city leadership to help facilitate a space for open, honest conversation between patients and healthcare CHD staff. Prospective vaccine recipients could address concerns and ask questions at vaccination events, virtual town halls or by calling our COVID Command center.

CHD staff approached these conversations without judgment, working to listen to an individuals concerns first and educate second. This study found that listening to the questions and concerns of people who are vaccine hesitant can be a more convincing use of time than just trying to get people educated or informed. CHD strives to give care leading with compassion. Our staff remained well-trained to answer health questions about the risk of vaccinations and their side effects and to emphasize the risks of COVID-19 virus versus the safety and effectiveness of the vaccines but allowing personal stories and rationales to drive interactions. Being able to provide a space for personal testimonials allowed CHD to learn more about the concerns in our community.

If you still have concerns about being vaccinated, CHD would like to hear from you COVID-19 Vaccine Exit Survey (cchmc.org). CHD is interested in gaining a better understanding of our community in order better serve Cincinnati.

How Do Vaccines Get Approved?

- ***Research and Development:*** The COVID-19 vaccines were available to the public quickly and are some of the most highly researched vaccines on the market. Basic Research, Discovery and Pre-Clinical Studies are the first steps of vaccine development often called the Research and Development stage. *For COVID-19 vaccines were able to move through these processes quickly by using vaccine data from existing vaccines such as vaccines made for other SARS viruses that were already developed and approved. Therefore, several months worth of exploration research and preclinical data already existed. For example, the COVID-19 Research regarding using mRNA began in the 1960s and the discovery on how to deliver mRNA into cells was developed in the 1970s. Over the following decades this mRNA technology was researched, and in 2013 vaccines using this mRNA technology were finally introduced and used to combat the Ebola outbreaks in Africa. With the advancement and success of this decades long research and development , mRNA technology was able to be used to produce safe and effective COVID-19 vaccines. he process was by creating vaccine candidates immediately after viral genome sequencing was made available and using vaccine platforms developed for other diseases. Building off of existing research of similar vaccines and viruses the Research and Development phase was able to be reduced from 5 months to 3 months.* *[22-24]*

After researchers develop a formula, all vaccines must go through a rigorous set of clinical trials to measure their safety and effectiveness. These clinical trials are divided into three phases:

- ***Phase I:*** This trial is made up of **20 to 100** volunteers. This phase only lasts a few months and is used to determine the safety of the vaccine and to identify the common reactions the body may have after receiving the vaccine. *This process in the COVID-19 vaccines was not accelerated or altered.* *[22-25]*

- ***Phase II:*** This trial is much larger and uses anywhere from **100 to 300** volunteers, this phase can take a few months up to two years, depending on the number of participants and the time needed to monitor them. The data gained from this phase is used to measure how effective and safe the vaccine is in protecting those who receive it. *Due to widespread COVID-19 cases at the time, the abundance of data allowed for an accelerated collection process to enable rapid data analysis.* *[22-25]*

- ***Phase III:*** Upon success in the first two phases, a third phase is conducted. In this phase anywhere from **300 to a few thousand** volunteers participate. These trials can last several years, due to the need for monitoring of those who received the vaccine and the need for comparison to those who have not received the vaccine but are exposed to the disease or have the condition. *Phase III can average 42 months but was accelerated for COVID-19 to 12 months by using large-scale trials with 30,000 volunteers. Extensive spread of COVID-19 in the population allowed for a large number eligible of participants. An abundance of rapid data and results permitted accelerated analysis of safety and efficacy in a diverse group of people.* *[22-25]*

- ***Post Approval:*** Once the data collected shows that a vaccine is safe and effective, the FDA (Food and Drug Administration) and ACIP (Advisory Committee on Immunization Practices) will review the data and give their recommendation on whether it will be distributed to the public. *For COVID-19 this process was expedited by cutting all wait times, moving through a typical 6-month process in just 2 weeks. When the application was completed, FDA and ACIP immediately met, discussed and reviewed the data. FDA and ACIP approved vaccines for emergency use with ongoing monitoring.* After approval, all vaccines continue to be monitored for years to ensure ongoing safety and effectiveness. *[22-25]*

Another reason COVID-19 vaccines became available to the public quickly was manufacturing was done simultaneously with clinical trials. Funded by the U.S. government, promising vaccines were manufactured and stored awaiting approval. Once a vaccine was approved, a large supply was ready to be shipped out to vaccine providers immediately. With all the information and data collected over the large trials, the FDA is able to review the vaccine's **safety and effectiveness in a shorter amount of time without cutting any corners in its safety** to patients. *[22-25]*

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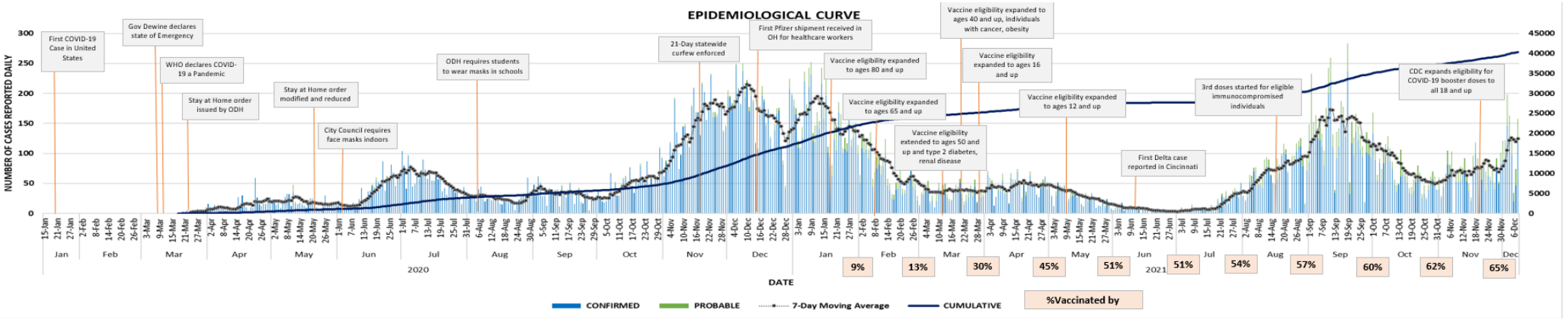
This report is intended to provide more information about vaccination in Cincinnati, and is not intended to be individual medical advice. If you have questions specific to your situation, contact your healthcare provider.

Appendix A



Appendix B