

WASHOE COUNTY HEALTH DISTRICT

ENHANCING QUALITY OF LIFE

COVID-19 Epidemiology Surveillance Program Report 2020 – 2022



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Cover photo by Cindy Hawks

Table of Contents

Summary of Key Findings	3
Introduction	4
Description of the Community.....	5
Early Tracking and Monitoring.....	7
Response Timeline	10
Variants	18
Vaccinations.....	22
Hospitalizations	28
Underlying Health Conditions.....	30
Deaths	32
Breakthrough Cases	35
Reinfections	38
HBV/HCV Coinfection	41
HIV Coinfection.....	45
Limitations	47
Dedication	47
Glossary/Key Terms	48
Links.....	49

Summary of Key Findings

Metrics	2020	2021	2022
Number of Cases	35,984	37,816	51,922
Cases per 100,000 Population	7,557	7,795	10,466
Hospitalizations	2,691	2,355	1,745
Hospitalizations per 100,000 Population	565	485	352
Deaths	507	566	265
Deaths per 100,000 Population	106	117	53

For definitions and specifics on metrics summarized, refer to the Glossary/Key Terms.

The purpose of this report is to provide data in context with major events and benchmarks taking place during the Washoe County Health District's COVID-19 pandemic response, locally and globally. This includes metrics for Washoe County case counts, vaccinations, hospitalizations, intensive care unit (ICU) status, deaths, and reinfections for calendar years 2020 through 2022. This report serves as a summary of the start of the pandemic through the end of 2022 and includes figures, tables, and text summarizing trends for cases reported during this timeframe.

From March 2020 through December 2022, there were multiple major surges, each occurring after the initial detection and subsequent spread of new variants of concern: Alpha, Delta, Omicron. Breakthrough infections and reinfections spiked during the Omicron surge.

COVID-19 vaccination is recommended for ALL persons aged 6 months or older, with special guidance for those at high risk for severe infection. Those who identify as White, Non-Hispanic and those in the 65+ age group have the highest vaccination rates through the first 3 years of the pandemic.

Introduction

The Epidemiology Program is part of the Division of Epidemiology and Public Health Preparedness at the Washoe County Health District. Epidemiologists were the first team engaged in the pandemic response in the county starting in late January 2020. Daily calls with the Center for Disease Control and Prevention (CDC) Emergency Operations Center were held to provide updates and rapidly evolving changes in the prognosis of disease spread and new hypotheses of how the virus spread.

The Division of Epidemiology and Public Health Preparedness monitored Washoe County residents who travelled internationally or by cruise ship in order to identify high risk persons who may be experiencing illness indicative of the novel coronavirus. Public health laboratories were not certified and cleared to run the diagnostic tests to detect the novel coronavirus due to faulty test kits and once cleared, were not permitted to conduct tests without permissions from CDC, which required consulting on a case-by-case basis. Once positive cases were confirmed by CDC in multiple states, public health laboratories and public health were granted freedom to test without consulting with CDC. Testing supplies were limited, manufacturers in other countries were locking down, impacting supply chains, and therefore hampering ability to test.

The early days of the pandemic were filled with uncertainty, limited data, and growing frustration from the public with CDC's ever-changing rules and case definitions. Once cases were identified and testing became more routine, staff from every department of the Health District were called to action to help with the response.

The first case in Washoe County was detected on March 5, 2020, and occurred in a person returning from the Grand Princess cruise liner. The following section provides details of the community and outlines the early pandemic activities and impacts.

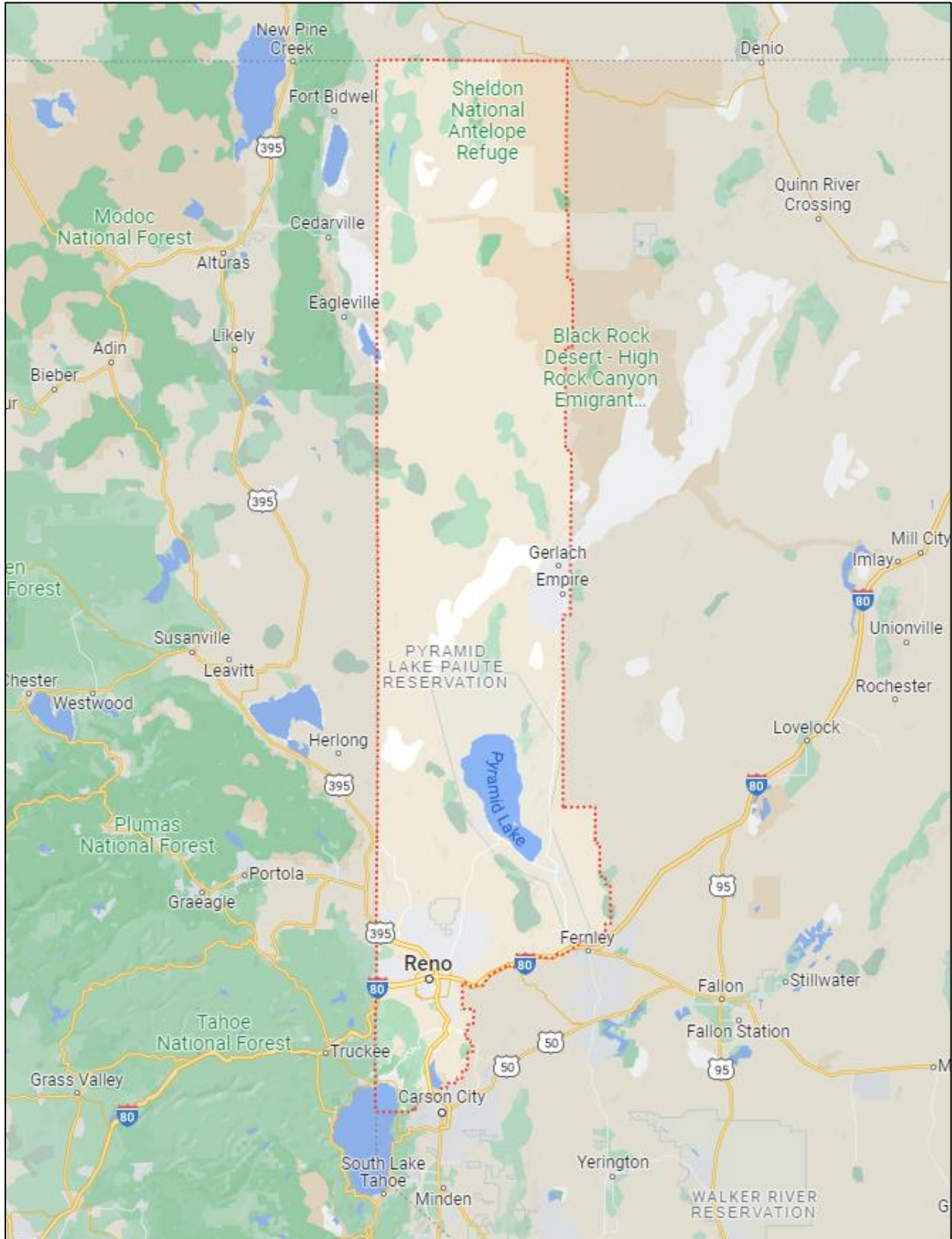
Description of the Community

Washoe County encompasses over 6,600 square miles, borders both California and Oregon and is home to nearly 500,000 residents. Washoe County is predominately rural with a metropolitan area in the southern portion of the county consisting of the cities of Reno, Sparks, and surrounding areas Washoe Valley and Incline Village. The regional hospitals, located in Reno and Sparks, capture service areas including several neighboring rural counties in Nevada and California, which places additional strain on the healthcare systems.

Table 1. Population and Select Demographics, Washoe County, 2020-2022

Year		2020	2021	2022
Total Population		476,139	485,113	496,124
Gender	Male	236,970	241,623	247,239
	Female	239,169	243,490	248,885
Race/Ethnicity	White, non-Hispanic	297,255	300,471	304,409
	Black, non-Hispanic	12,415	13,020	13,464
	Native American, non-Hispanic	7,415	7,321	7,135
	Asian, non-Hispanic	34,276	35,708	37,213
	Hispanic	124,778	128,592	133,904
Age Group	0-17 years	108,606	107,444	108,377
	18-29 years	81,255	84,995	88,876
	30-49 years	121,441	124,264	126,728
	50-64 years	89,120	89,296	90,409
	65+ years	75,717	79,114	81,735

Figure 1. Map of Washoe County, 2023

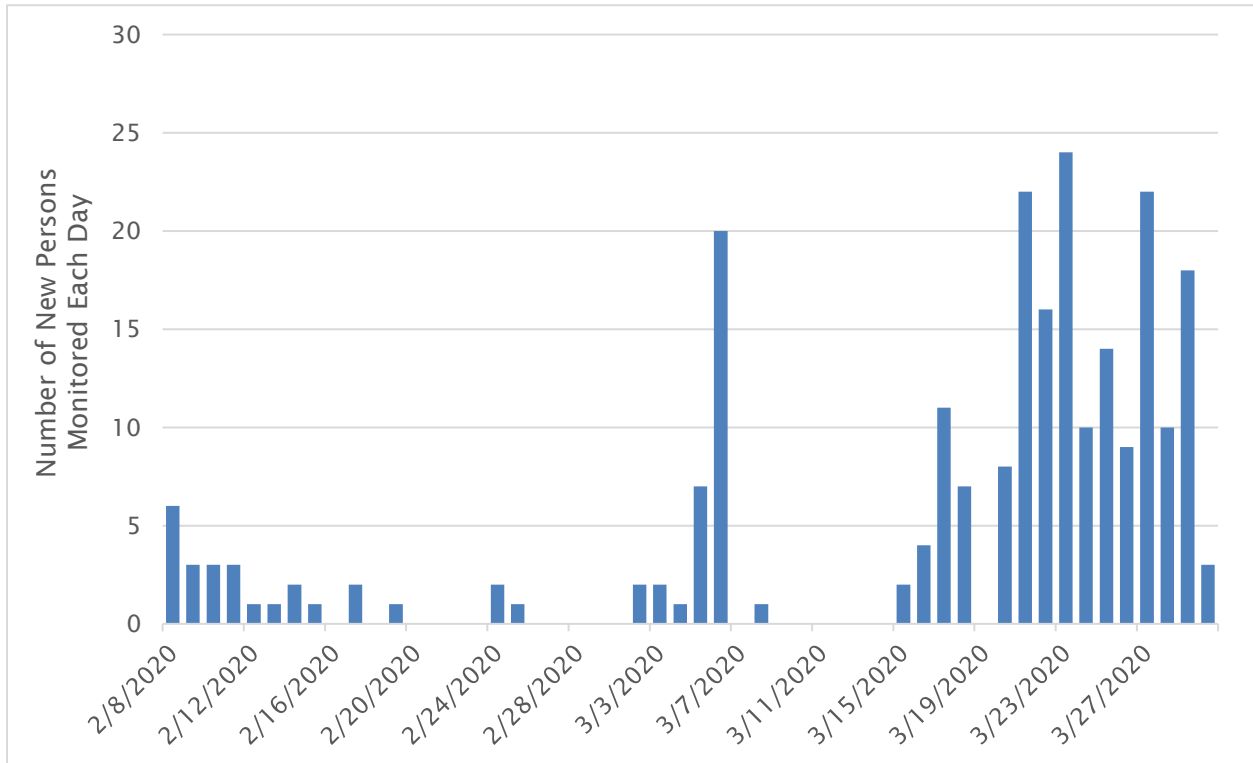


Data Source: Google Maps

Early Tracking and Monitoring

Prior to detecting any positive cases, the Division of Epidemiology and Public Health Preparedness staff were tasked with tracking and monitoring persons returning from countries identified as high risk by the CDC, as well as those disembarking from cruise liners. Returning travelers were contacted and assessed to verify if symptoms were present already, if so, it was recommended they be tested. If no symptoms were reported, the returning travelers were monitored for the full incubation period for the novel coronavirus, 14 days, and required to stay home for the duration of the monitoring period. From February 8 through March 30, 2020, 146 vessels were monitored. Of the vessels, 5 were cruise ships and 141 were arriving flights. A total of 239 returning travelers were followed up with and monitored by staff.

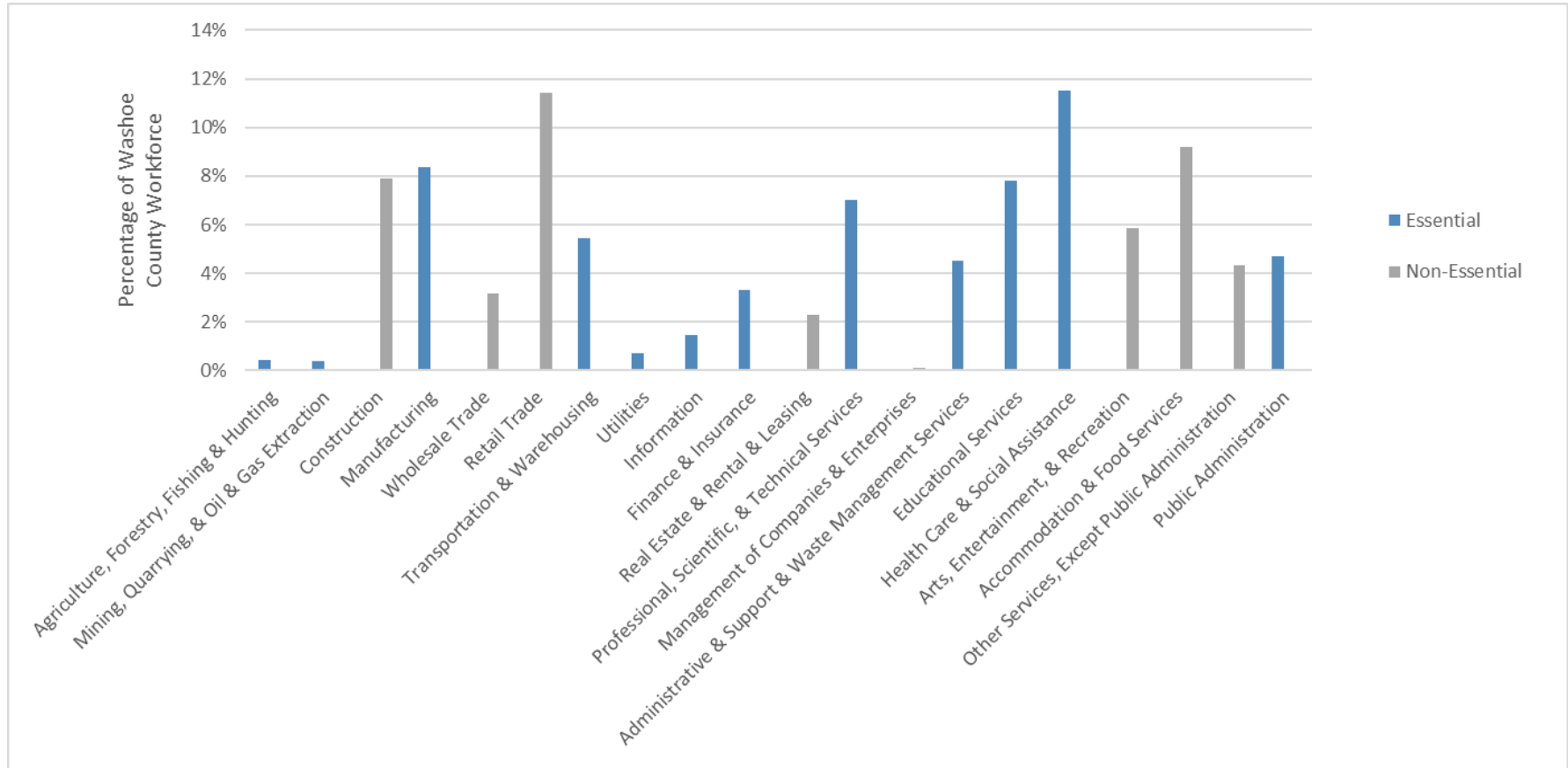
Figure 2. Number of New Persons Monitored for 14 Days by Initiation of Monitoring Date, Washoe County, February–March 2020



To slow and prevent the spread of the virus, the Governor issued a Declaration of Emergency on March 12, 2020. Beginning March 16, 2020, Washoe County School District closed, and on March 20, 2020, all non-essential businesses were ordered to close until April 16, 2020.¹ Only those persons who worked in essential business were permitted to work in person.

¹ State of Nevada Executive Department. Declaration of Emergency. https://doe.nv.gov/uploadedFiles/ndedoenvgov/content/News__Media/DeclarationofEmergencyDeclaration005.pdf. Reviewed July 27, 2023.

Figure 3. Proportion of Employed Population by Economic Sector: Essential versus Non-essential Duties*, Washoe County, 2020



* In 2020, there were 236k employed workers in Washoe County, NV. Of that employed population, 55.8% were classified as “essential”.

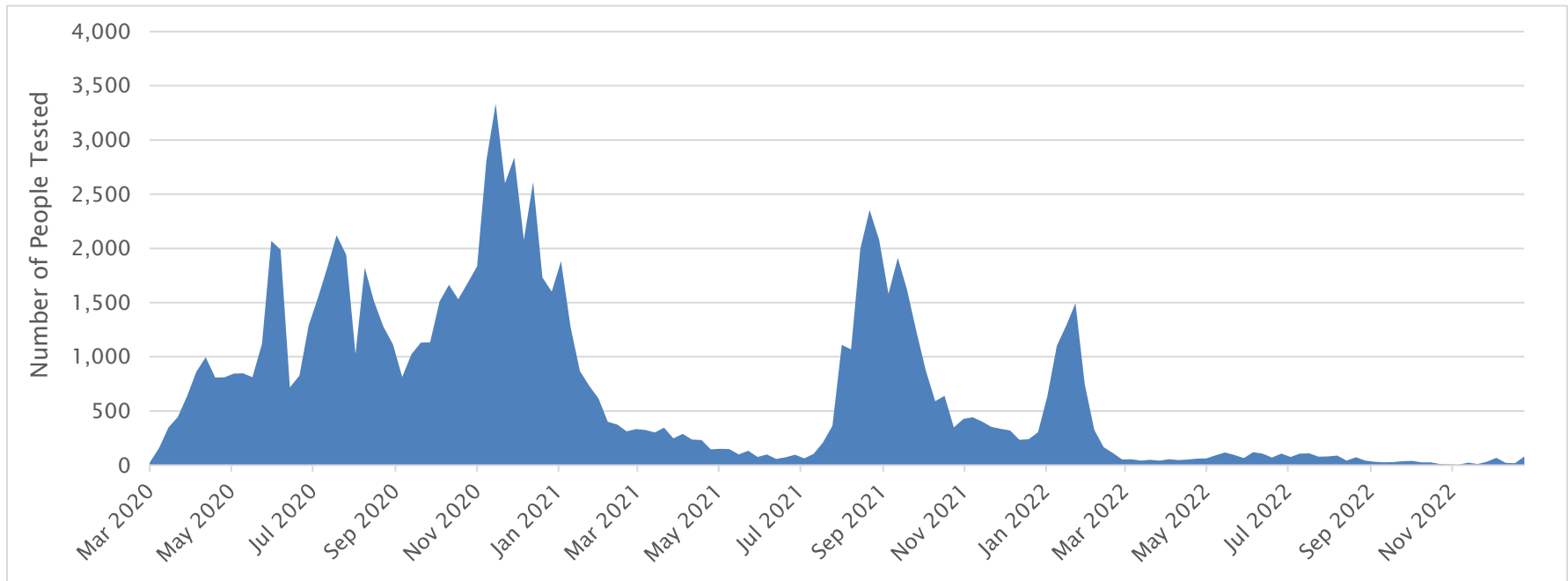
Sector Data Source: [https://datausa.io/profile/geo/washoe-county-nv#:~:text=The%20most%20common%20employment%20sectors,Food%20Services%20\(21%2C685%20people\)](https://datausa.io/profile/geo/washoe-county-nv#:~:text=The%20most%20common%20employment%20sectors,Food%20Services%20(21%2C685%20people))

Essential Duties Data Source: https://www.cisa.gov/sites/default/files/publications/essential_critical_infrastructure_workforce-guidance_v4.1_508.pdf

Essential Duties Data Source: https://www.cisa.gov/sites/default/files/publications/essential_critical_infrastructure_workforce-guidance_v4.1_508.pdf

Throughout the pandemic, Washoe County Health District staff tested individuals at the drive-through point of screening and testing (POST) site that was set up at the Health District, and later WCHD was able to establish homebound testing for persons unable to drive to the POST location.

Figure 4. Washoe County Health District Number of People Tested by Week* for COVID-19, 2020-2022



* 2020 and 2021 MMWR weeks did not include “Homebound” testing, only POST testing. MMWR weeks in 2022 include “Homebound” testing as well as POST testing as this is when those data were recorded.

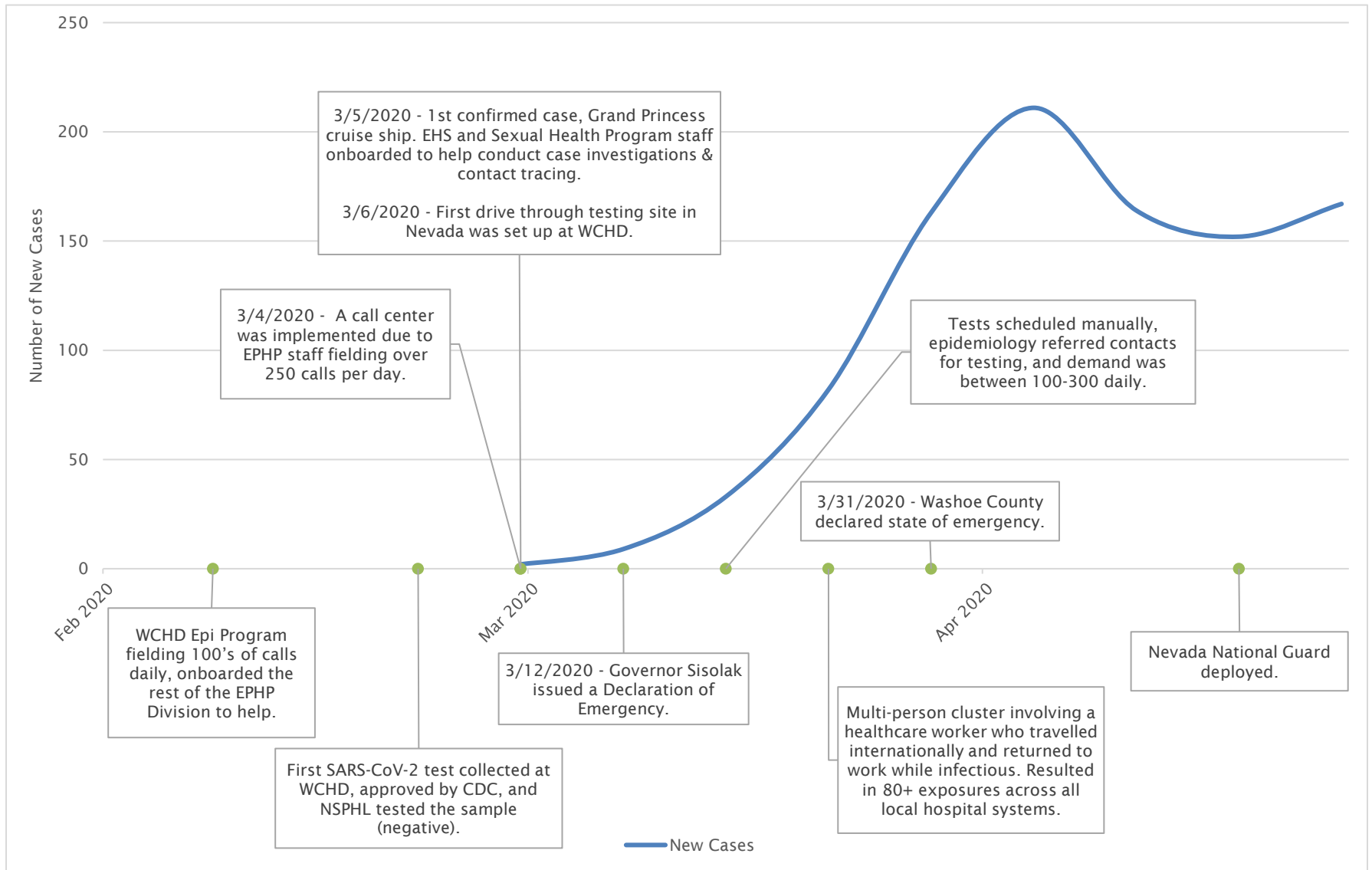
Response Timeline

The World Health Organization (WHO) declared a global pandemic due to the novel coronavirus on March 11, 2020. The novel coronavirus was later named COVID-19, which is the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus. Symptoms include fever, chills, rigors, myalgia, headache, sore throat, nausea or vomiting, diarrhea, fatigue, congestion or runny nose, cough, shortness of breath, difficulty breathing, olfactory and taste disorder, confusion or change in mental status, persistent pain or pressure in the chest, pale, gray, or blue colored skin, lips, or nail beds, and inability to wake or stay awake. Severe respiratory illness may also present with pneumonia or acute respiratory distress syndrome.

The following section displays a timeline of WCHD activities and major benchmarks in the COVID-19 pandemic through 2022, as well as case counts through 2022 grouped by age and race/ethnicity.

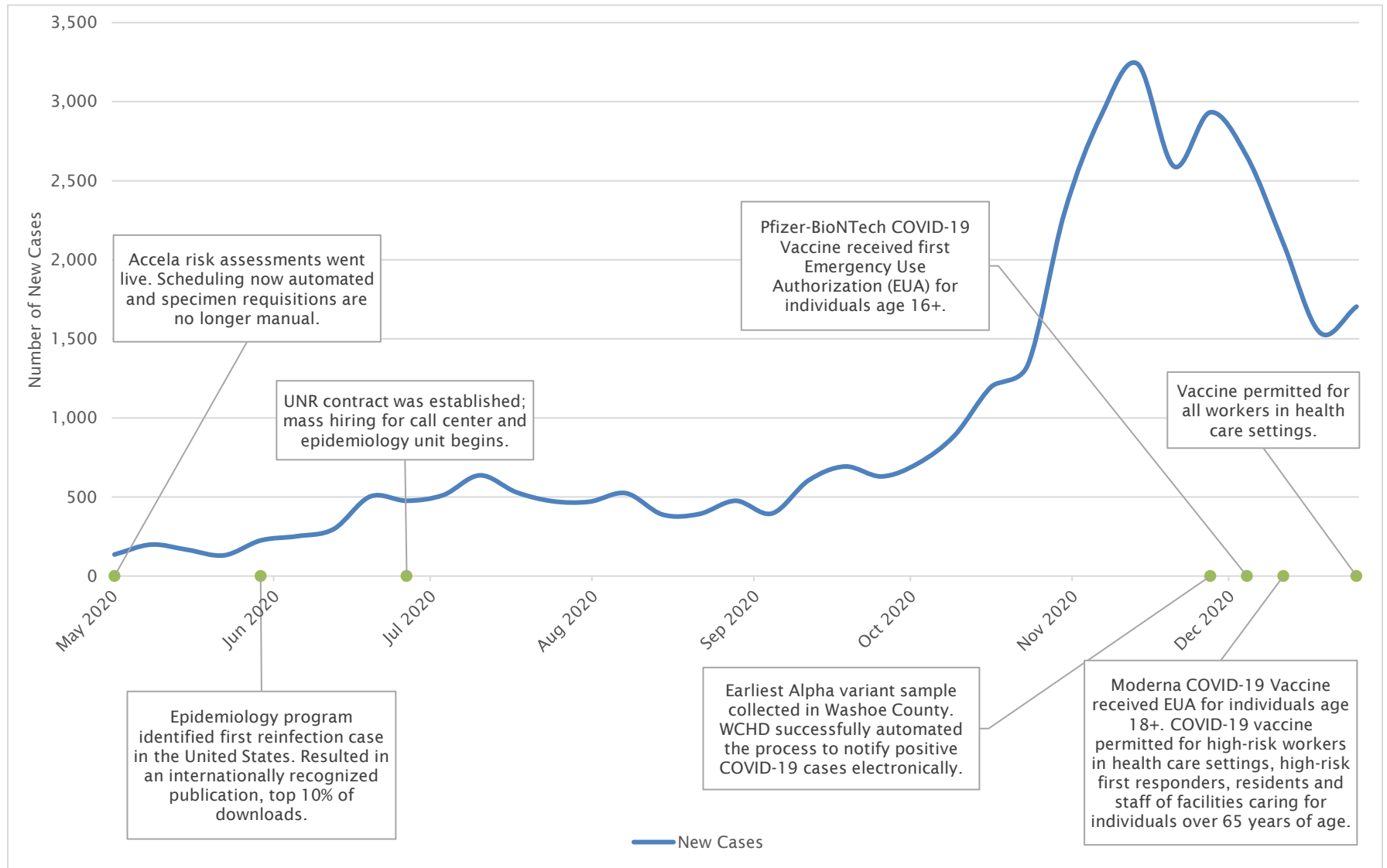
Trends can be seen with case counts increasing and decreasing as major events and changes occurred throughout the first three years of the pandemic, such as arrival of new variants and approval of vaccinations for different age groups over time. Additionally, there were shifts in the populations most impacted—earlier cases identified as predominately white, non-Hispanic persons who were returning from international travel. Later cases increased among those who worked in essential businesses and were required to work in-person, as well as persons who lived in multi-generation households or multi-family households. Throughout 2020, 2021, and 2022, there was not any specific race/ethnicity or age group that consistently had the highest or lowest rate of new cases, as shown in Figure 7.

Figure 5a. Timeline of Events and Case Count per Week, Washoe County, 2020



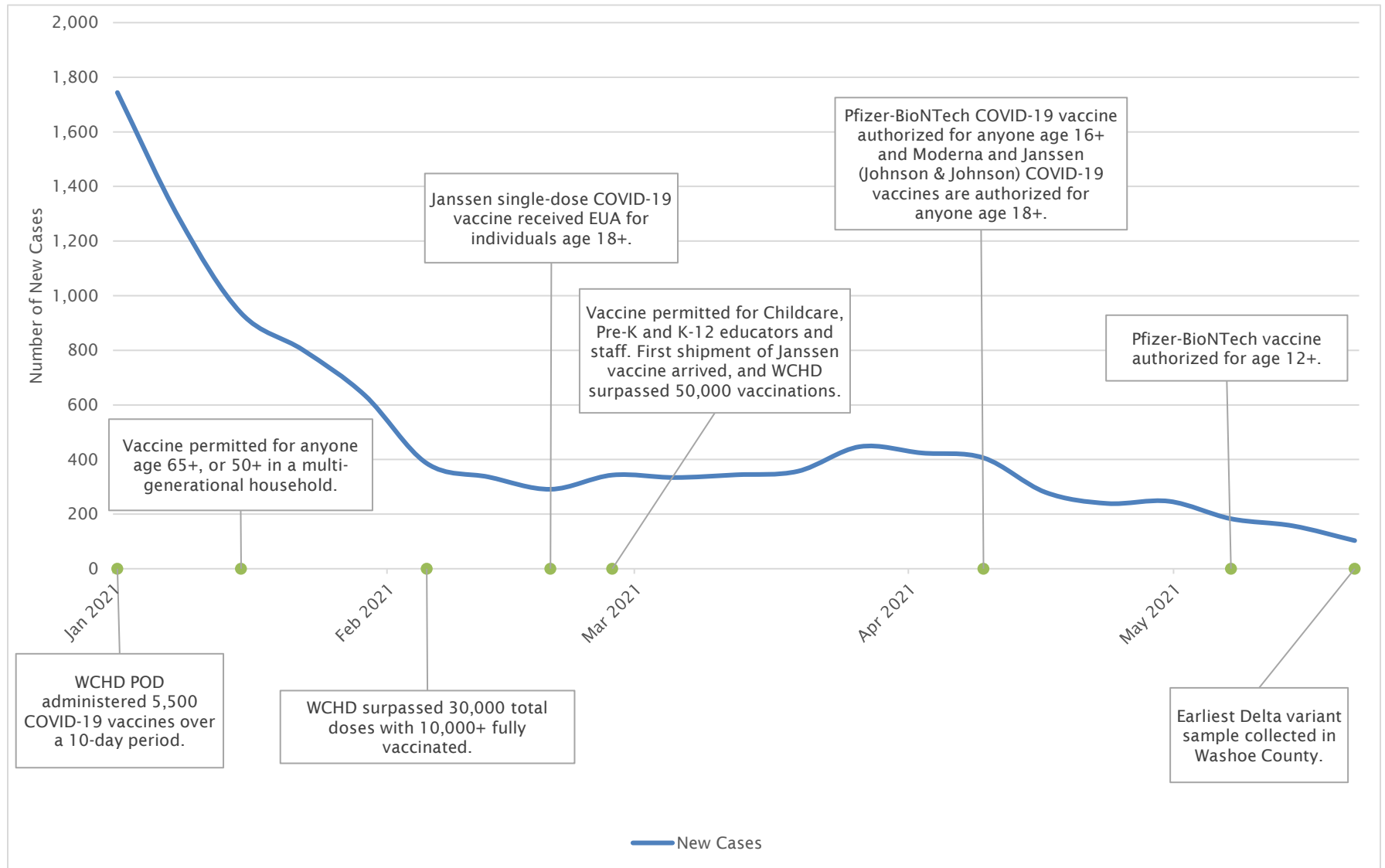
WCHD Benchmark and Earliest Variant Sample Collection Data: Internal, WCHD

Figure 5b. Timeline of Events and Case Count per Week, Washoe County, 2020



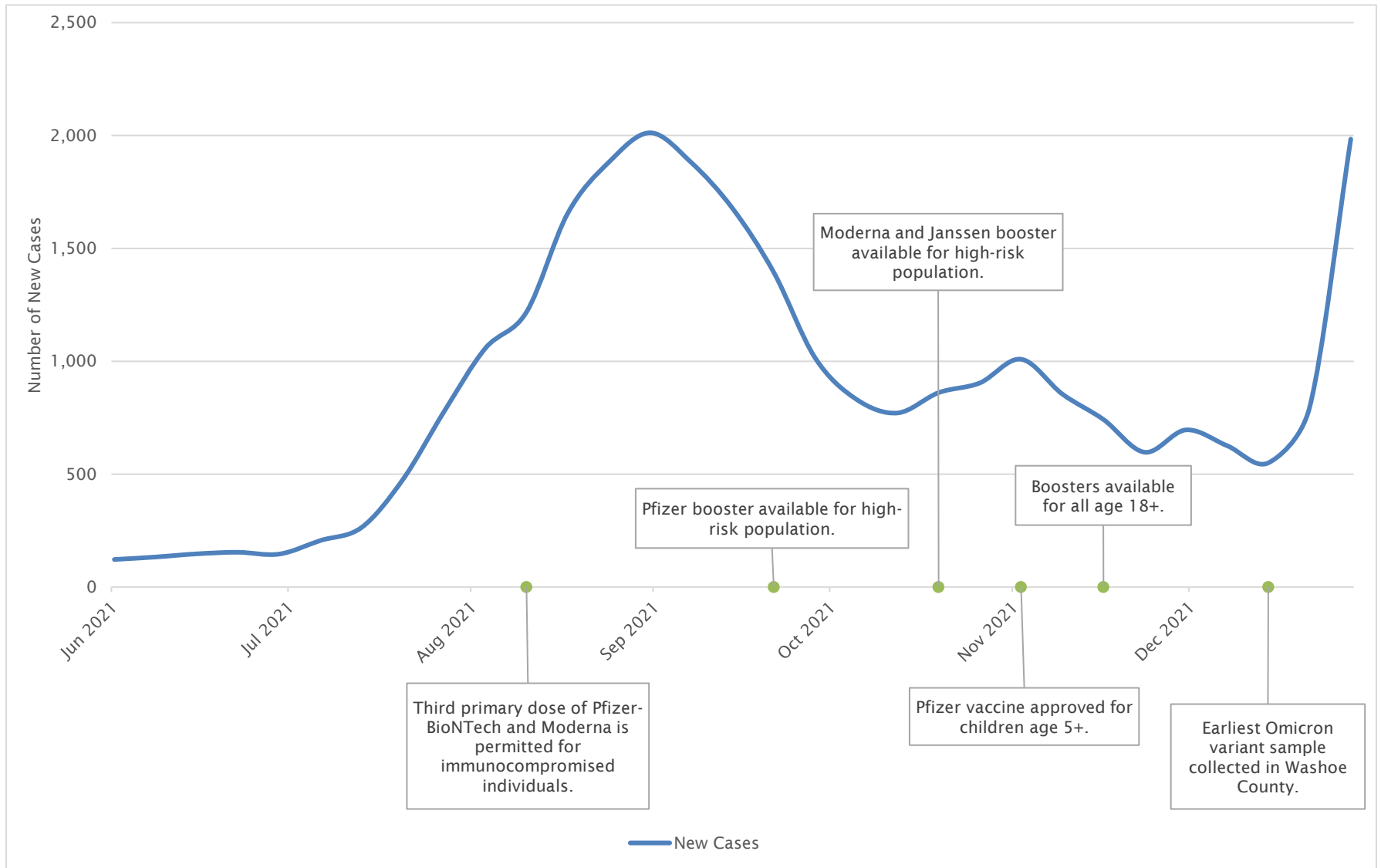
Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>
 WCHD Benchmark and Earliest Variant Sample Collection Data: Internal, WCHD

Figure 5c. Timeline of Events and Case Count per Week, Washoe County, 2021



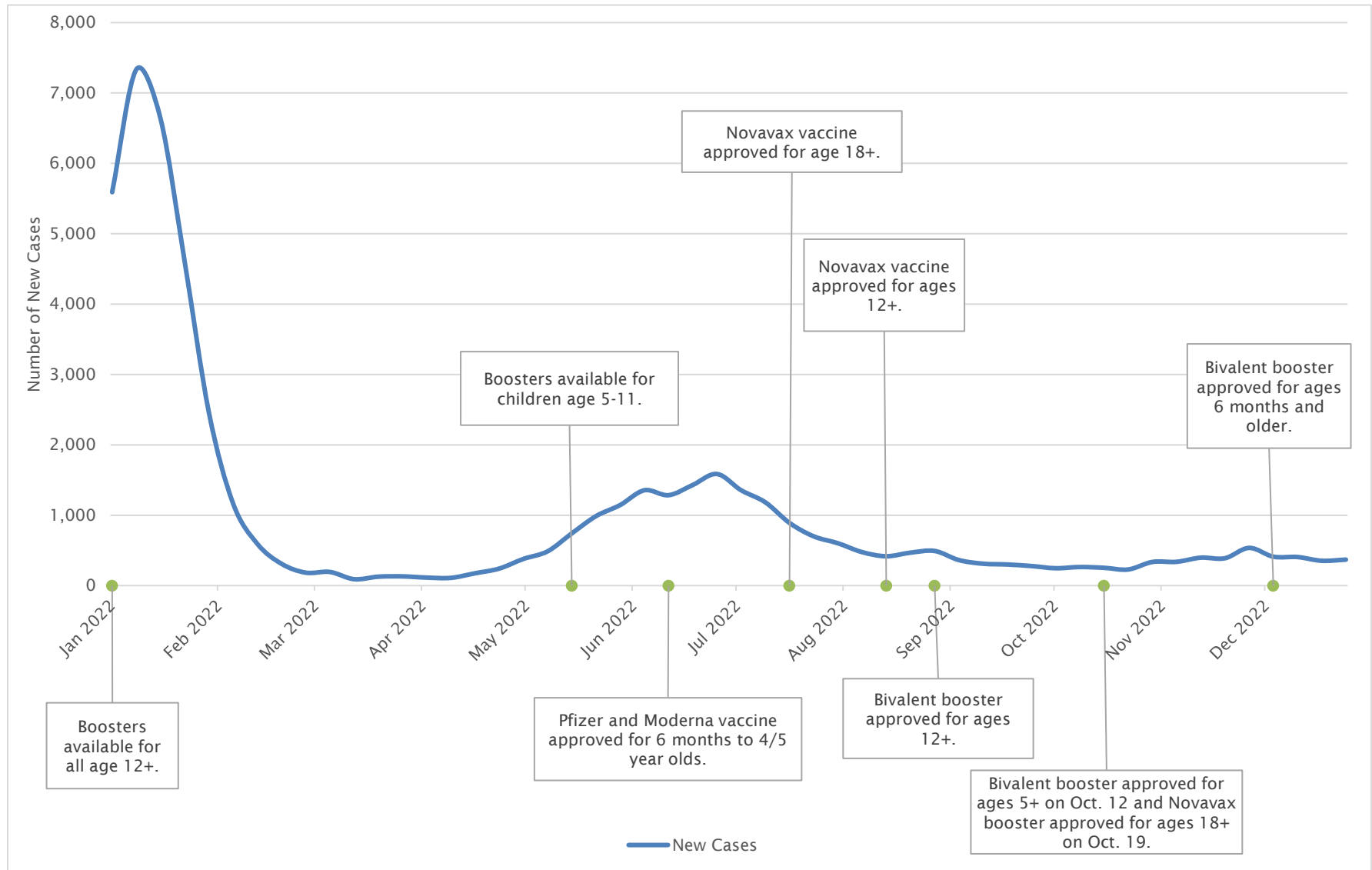
Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>
 WCHD Benchmark and Earliest Variant Sample Collection Data: Internal, WCHD

Figure 5d. Timeline of Events and Case Count per Week, Washoe County, 2021



Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>
 WCHD Benchmark and Earliest Variant Sample Collection Data: Internal, WCHD

Figure 5e. Timeline of Events and Case Count per Week, Washoe County, 2022



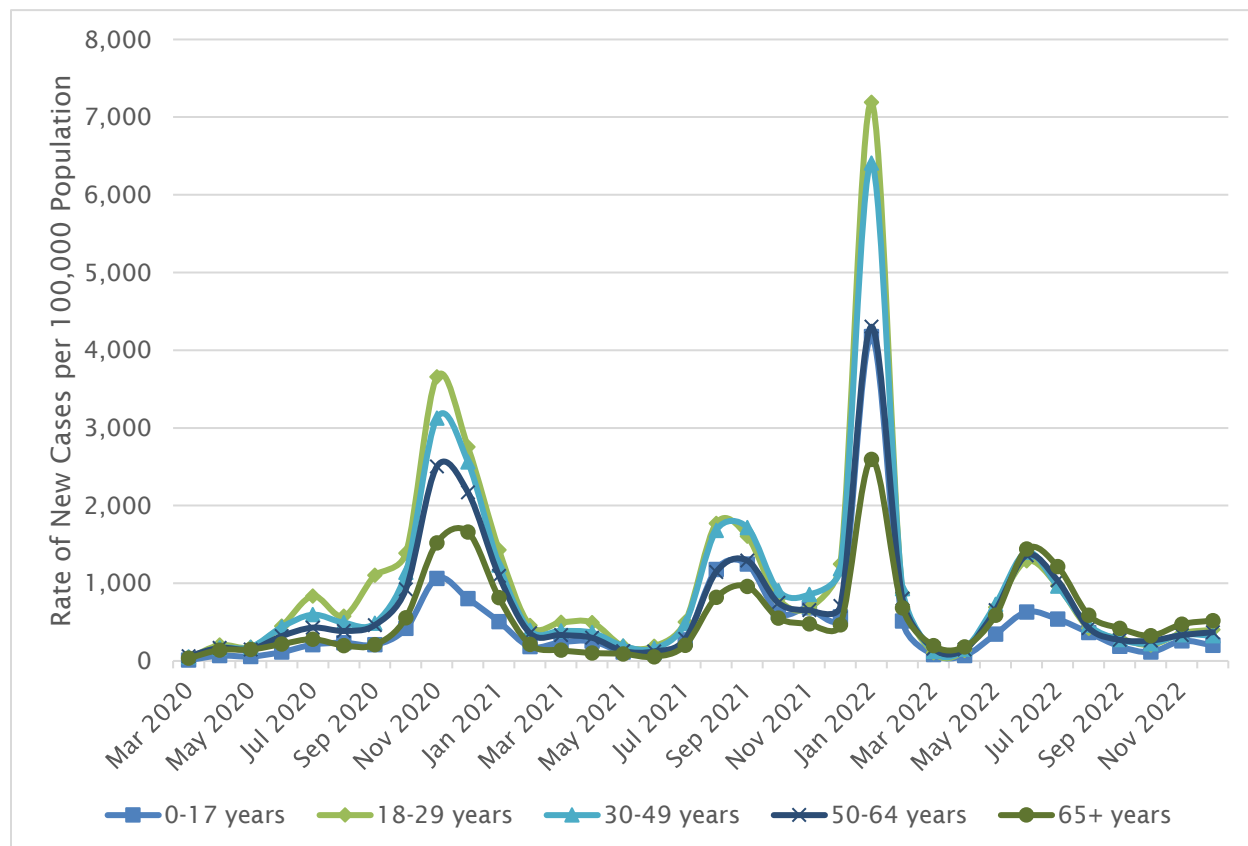
Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>

During 2020 and 2021, the 18-29 age group consistently had the highest rate of new cases per 100,000 population, whereas the age group with the lowest rate of new cases per 100,000 population was in the 0-17 age group and in March of 2021, the lowest rate was among the 65+ age group.

During the October 2020 to January 2021 surge, the 18-29 age group had the highest case rate with 3,659 new cases per 100,000 population and the 0-17 age group had the lowest case rate with 1,064 new cases per 100,000 population in November 2020—when Washoe County School District closed schools and went fully remote. At the peak of the surge occurring from July 2021 through October 2021, the 18-29 (1,770 new cases per 100,000 population) and 30-49 (1,719 new cases per 100,000 population) age groups had the highest case rate in August and September 2021, respectively.

The largest surge to date occurred during January 2022, where the 18-29 age group had the highest case rate with 7,193 new cases per 100,000 population. The 65+ age group had the lowest case rate with 2,593 new cases per 100,000 population. By the end of 2022, the 65+ age group had the highest rate of new cases per 100,000 population (520 new cases per 100,000 population) and the 0-17 age group dropped back to the lowest case rate (202 new cases per 100,000 population).

Figure 6. Rate of New Cases Reported Each Month by Age Group, Washoe County, 2020-2022

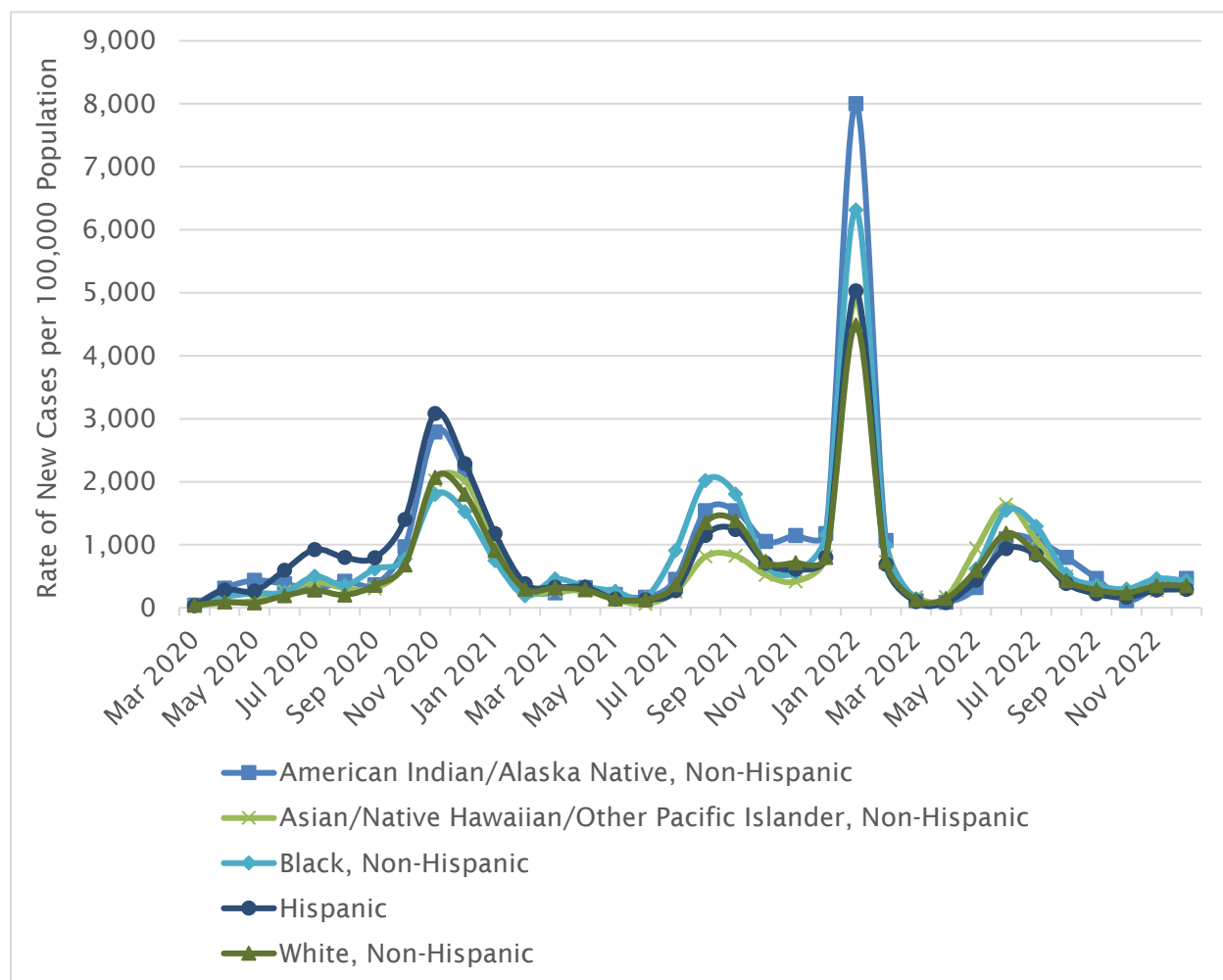


During the October 2020 to January 2021 case surge, those who identified as Hispanic had the highest rate of new cases with a peak of 3,081 new cases per 100,000 population in November 2020.

At the peak of the July 2021 through October 2021 surge, those who identified as Black, Non-Hispanic had the highest rate of new cases with 2,020 new cases per 100,000 population in August and 1,805 new cases per 100,000 population in September. Those who identified as Asian/Native Hawaiian/Other Pacific Islander, Non-Hispanic had the lowest rate of new cases at the peak of the surge occurring from July 2021 through October 2021 with 812 and 825 new cases per 100,000 population in August and September 2021, respectively.

During the peak surge (January 2022), American Indian/Alaska Native, Non-Hispanic had the highest case rate with 8,003 new cases per 100,000 population and White, Non-Hispanic had the lowest case rate of with 4,488 new cases per 100,000 population.

Figure 7. Rate of New Cases Reported Each Month by Race/Ethnicity*, Washoe County, 2020-2022



* From 2020 through 2022, 3.8% of cases were recorded as “Declined to answer”, “Multiple”, “Other”, or “Unknown” and rates per 100,000 population are unable to be calculated for those categories.

Variants

Viruses naturally acquire genetic mutations over time, producing variably infectious and virulent versions of the viruses by selective pressure. Variant strains started to emerge early in the pandemic. SARS-CoV-2 variants have been monitored and tracked around the world over the course of the pandemic. The WHO or the U.S. SARS-Cov-2 Interagency Group (SIG) designate variants as variants of interest (VOI), variant of concern (VOC), variant of high consequence (VOHC), or variant being monitored (VBM) based on various attributes. VOCs garner the most attention from the public, health officials, and scientists. Attributes of VOCs include increase in transmissibility, more severe disease than other variants, significant reduction in neutralization by antibodies generated during previous infection or vaccination, and reduced effectiveness of treatments or vaccines, or diagnostic detection failure.² Over time, through natural selective mutation, the SARS-CoV-2 virus acquired mutations that led to these different variants.

The Nevada State Public Health Laboratory (NSPHL) has detected a wide variety of variants and sub-variants occurring among Washoe County residents since the implementation of regularly sequencing samples in January of 2021. Variant data was tracked as early as March of 2021, starting with the Alpha wave. Alpha, Delta, and Omicron are the major variants of concern. Each emergent variant had increased transmissibility and contributed to an increase in case counts, hospitalizations, and deaths from late 2020 with the initial detection of Alpha through the Omicron variant, which continued to dominate through 2022.

The Alpha variant was first detected and reported in Great Britain in late 2020 and quickly became the dominant variant in the U.S. Data indicated Alpha was 30-50% more contagious than the original virus and was thought to be more likely to lead to hospitalization and death than the original SARS-COV-2 strain.³ The earliest Alpha sample in Washoe County was collected on December 2, 2020. The last Alpha sample in Washoe County was collected on August 3, 2021.

As Delta emerged, it replaced Alpha as the dominant variant. Delta was initially detected and reported in India in late 2020. In June 2021, case counts rapidly spiked in the U.S., which had been steadily in decline for months.³ Delta has a higher replication rate and it has a viral load about 1,000 times greater in infected individuals than the original SARS-CoV-2 virus and previous variants.⁴ Data from Connecticut estimated that Delta was 80-90% more transmissible than Alpha.³ Delta has also been associated

2 Center for Disease Control and Prevention. SARS-CoV-2 Variant Classifications and Definitions. <https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-classifications.html>. Reviewed June 30, 2023.

3 Katella, K. Omicron, Delta, Alpha, and More: What to Know About the Coronavirus Variants. <https://www.yalemedicine.org/news/covid-19-variants-of-concern-omicron>. Reviewed June 12, 2023.

4 Scovino, A.M., Dahab, E.C., Vieira, G.F., Freire-de-Lima, L., Freire-de-Lima, C., Morrot, A. SARS-CoV-2's Variants of Concern: A Brief Characterization. *Front. Immunol.*, Volume 13 (2022). <https://doi.org/10.3389/fimmu.2022.834098>

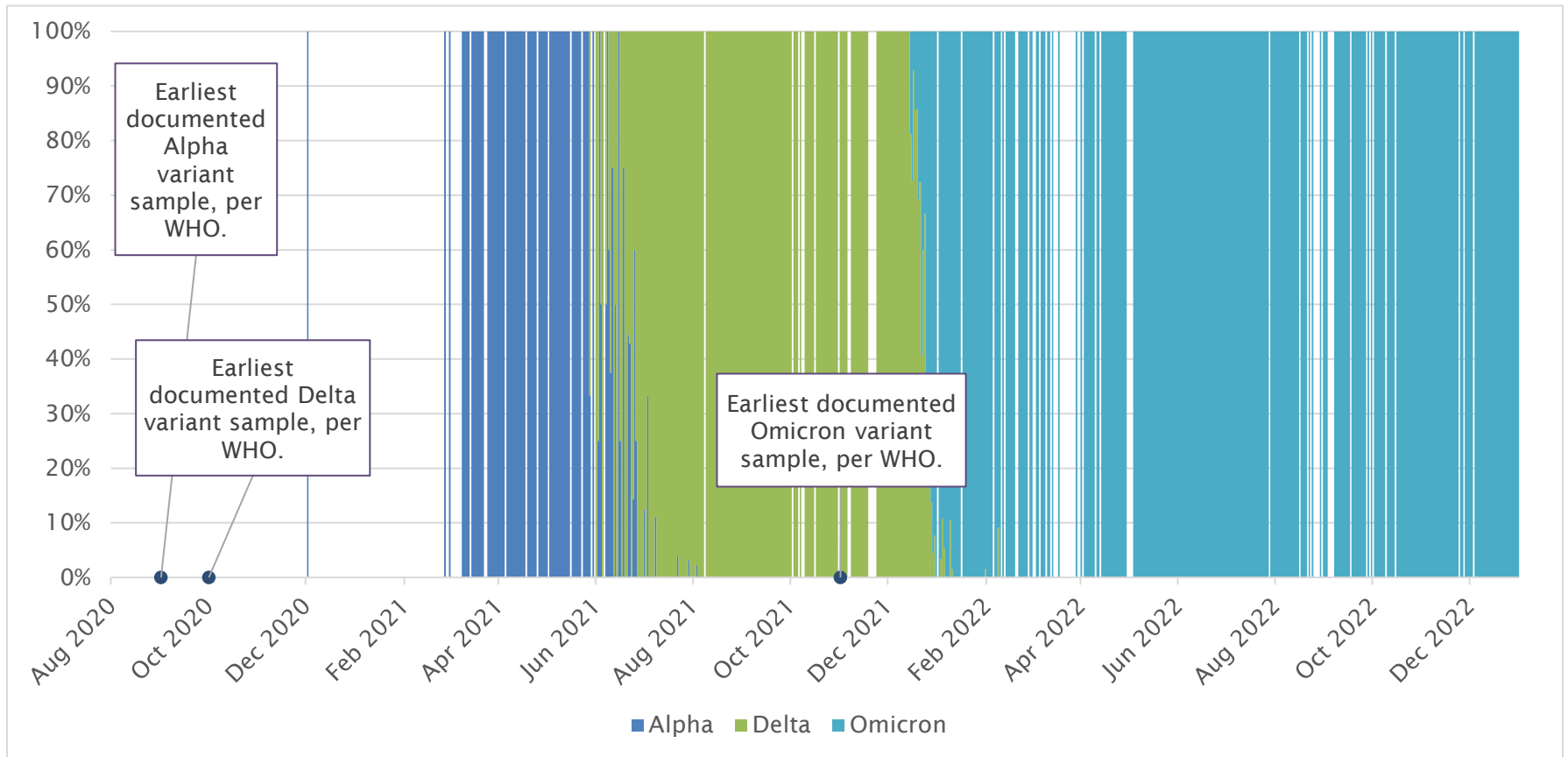
with more severe patient outcome.⁵ The vaccine provided protection against severe infection from Delta as unvaccinated individuals infected with Delta were more likely to have severe disease and become hospitalized.³ Delta overlapped with Alpha for three months. The earliest Delta sample identified in Washoe County was collected on May 28, 2021, and the last sequenced Delta sample was collected on February 8, 2022.

Omicron was initially detected and reported in South Africa in late November of 2021. Omicron and Delta overlapped for a few months, but Omicron caused the surge of early 2022 that greatly exceeded the previous waves. Omicron subvariants are the most transmissible strains of the SARS-CoV-2 virus to date, due to mutations in the spike protein that appear to increase infectivity.^{3,5} Omicron also expressed more immune-evasive traits and has had greater success at infecting vaccinated and previously infected individuals.⁶ In general, Omicron caused less severe disease than previous major variants.^{3,4} However, data from the surge in early 2022 suggest it caused more hospitalizations and deaths.³ There have since been many subvariants of Omicron, but none different enough to be classified as a new variant of concern. The earliest Omicron sample for Washoe County was collected on December 15, 2021, and has continued to be seen through the end of 2022.

5 Long, B., Carius, B. M., Chavez, S., Liang, S. Y., Brady, W. J., Koyfman, A., & Gottlieb, M. Clinical update on COVID-19 for the emergency clinician: Presentation and evaluation. *The American journal of emergency medicine*, 54, 46-57 (2022). <https://doi.org/10.1016/j.ajem.2022.01.028>

6 Willett, B.J., Grove, J., MacLean, O.A. et al. SARS-CoV-2 Omicron is an immune escape variant with an altered cell entry pathway. *Nat Microbiol* 7, 1161-1179 (2022). <https://doi.org/10.1038/s41564-022-01143-7>

Figure 8. Variant Emergence Timeline Globally and Sequencing Results Locally, Washoe County, 2020-2022



Earliest Documented Samples Data Source: <https://www.who.int/activities/tracking-SARS-CoV-2-variants>
 Variant Data Source: Internal (SharePoint), WCHD

Table 2. Percentage of Cases with Common Symptoms by Major Variant of Concern, Washoe County, 2020-2022

Symptom	% of Cases* (N=74,270)	% of Alpha Variant Cases** (N=3,235)	% of Delta Variant Cases† (N=12,516)	% of Omicron Variant Cases‡ (N=15,059)
Any Symptom	86.7	85.3	86.9	88.3
Respiratory				
Cough	58.8	57.6	62.5	68.3
Sore Throat	42.0	42.0	38.6	51.8
Running Nose	38.9	50.4	42.2	36.6
Shortness of Breath	20.8	21.3	20.2	16.5
Difficulty Breathing	12.0	13.7	11.2	9.6
Chest Pain	12.0	13.8	11.3	8.7
Wheezing	8.9	11.1	9.2	8.4
General				
Fatigue or Malaise	54.1	58.6	53.3	56.2
Muscle Aches	46.2	50.0	44.0	44.6
Subjective Fever	40.2	41.7	40.2	40.8
Chills	37.0	41.0	36.2	36.6
Loss of Appetite	20.8	18.9	18.9	24.8
Fever >100.4F (38C)	18.6	14.6	20.0	19.1
Rigors	1.3	0.0	0.0	2.6
Neurological				
Headache	51.0	55.9	50.6	47.6
New Olfactory and Taste Disorder	33.6	39.5	37.3	13.6
Gastro-intestinal				
Diarrhea	22.0	23.5	20.6	18.3
Nausea or Vomiting	20.2	21.0	20.1	19.6
Abdominal Pain or Tenderness	10.8	11.7	10.0	8.2
Other Symptom(s)				
Asymptomatic	3.7	6.6	3.4	1.3

* The cases used for this total are cases with a known symptomology via interview or electronic medical record review.

** 100% of reported sequences resulted in Alpha during symptom onset or collection dates of 2/26/2021 through 5/27/2021.

† 100% of reported sequences resulted in Delta during symptom onset or collection dates of 8/4/2021 through 12/14/2021.

‡ 100% of reported sequences resulted in Omicron during symptom onset or collection dates of 2/9/2022 through 12/31/2022.

Vaccinations

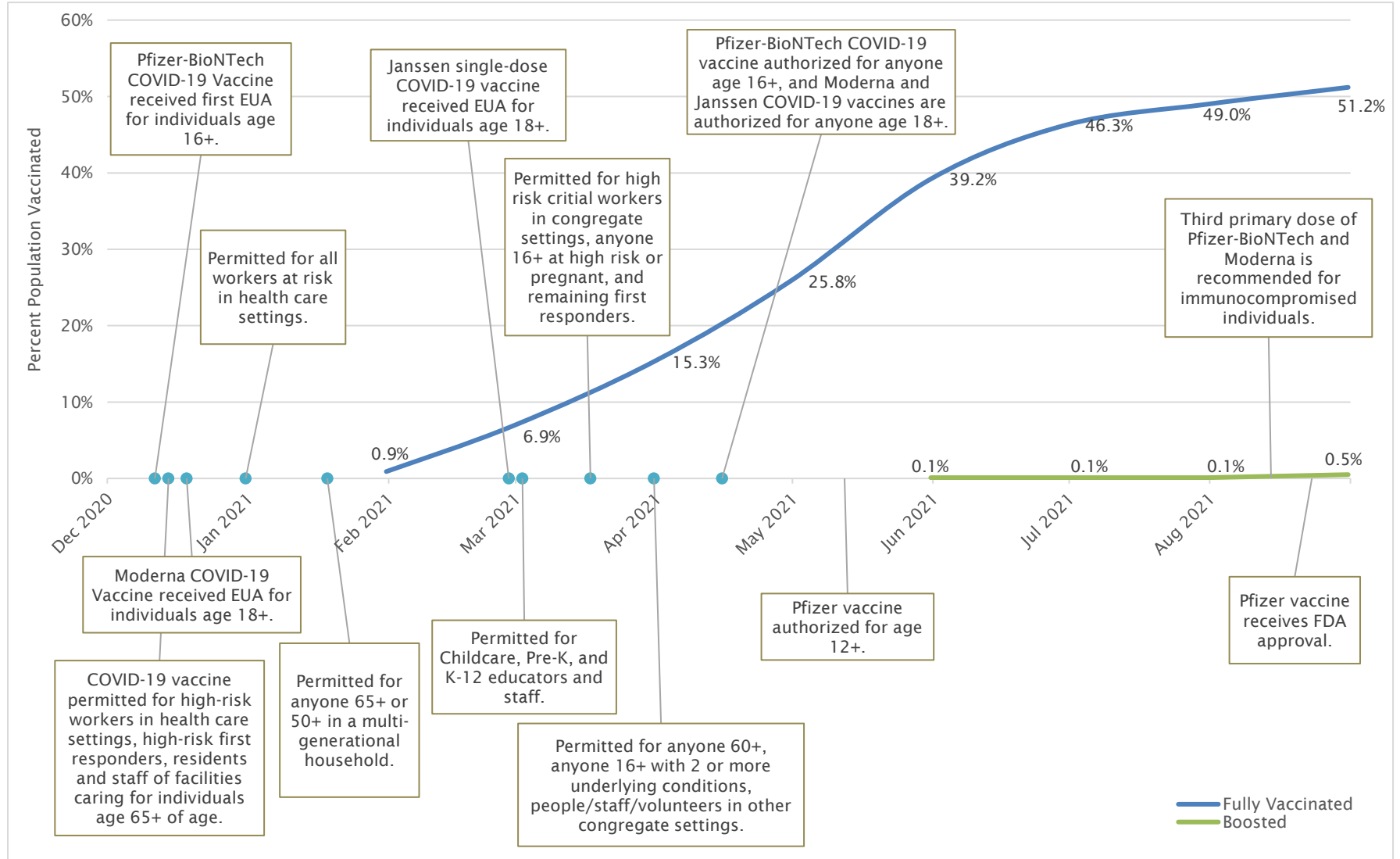
Vaccination for COVID-19 first became available in the United States in December of 2020 and persons were not considered fully vaccinated until 14 days after completing their primary series of vaccine (two doses of mRNA COVID-19 vaccine or one dose of viral vector COVID-19 vaccine). Vaccines were made available through Washoe County Health District, various providers, clinics, hospitals, pharmacies, and there were several pop-up events around the community. Washoe County Health District set up a drive-through point of distribution (POD) that vaccinated nearly 2,700 persons in a day.

The vaccines provide protection against severe COVID-19 infection and, as immunity waned, a booster dose was recommended in late 2021. With the arrival of the Omicron variant and the acknowledgement of greater immune- and vaccine-evasiveness, an updated bivalent booster dose was authorized in 2022. The bivalent booster dose was designed to recognize the Omicron BA.1 and BA.2 subvariants.

The guidance on what constituted “fully vaccinated”, “boosted”, and/or “up to date” changed over the course of the pandemic as authorizations and recommendations were updated. The percentage of persons vaccinated, provided in this section, illustrate the uptake of the vaccine among different populations, both demographically and geographically. Figure 9 displays the vaccination rates throughout the COVID-19 pandemic with the major vaccination changes and events identified on the timeline. By the end of 2022, 63.1% of Washoe County population completed primary series of vaccination and 32.0% of Washoe County population received a booster dose.

Table 3 depicts vaccination rates in Washoe County. The age group with the highest vaccination rates were those 65+ years with 85.1% of the population having completed their primary series and 62.2% of the population having received a booster dose by the end of 2022. Those who identify as White, Non-Hispanic had the highest rate of vaccination through 2022 with 49.0% of the population having completed their primary series and 25.8% having received a booster dose.

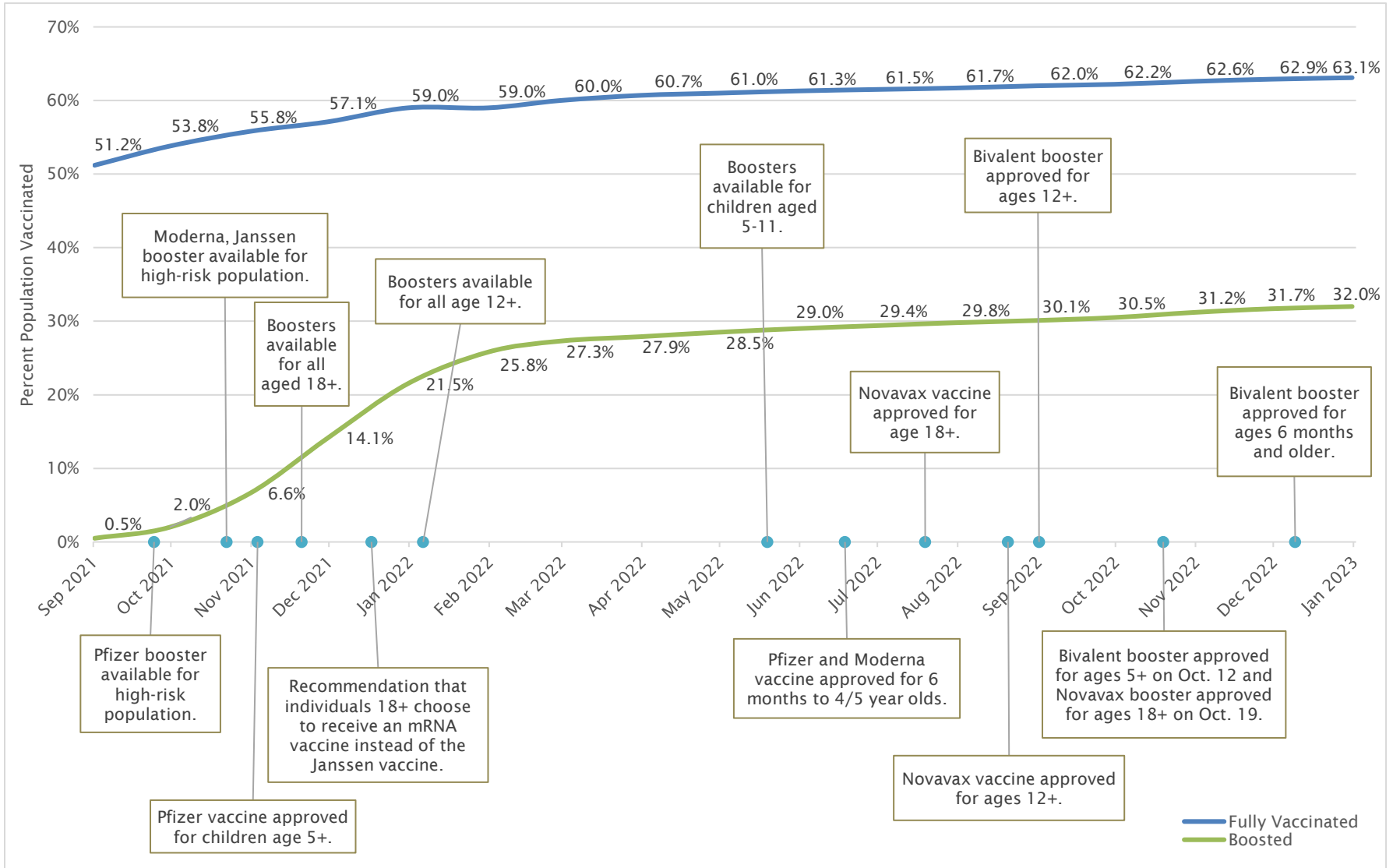
Figure 9a. Vaccination Timeline and Percent of Washoe County Residents with a Completed Primary Series and Population that has Received a Booster Dose, Washoe County, 2020-2021



Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>

Data presented in this report are preliminary and may be updated in future reports as additional information is received.

Figure 9b. Vaccination Timeline and Percent of Washoe County Residents with a Completed Primary Series and Population that has Received a Booster Dose, Washoe County, 2021-2022



Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>

Data presented in this report are preliminary and may be updated in future reports as additional information is received.

Table 3. Percentage of Population with a Completed Primary Series and Percentage of Population that had Received a Booster Dose by Sex, Age Group, and Race/Ethnicity*, Washoe County, 2021-2022

Select Demographics		% Population Completed Primary Series	% Population Received a Booster Dose
Sex	Female	65.5	34.9
	Male	60.6	29.1
Age Group	0-17 years	32.0	9.6
	18-29 years	59.5	19.2
	30-49 years	67.0	30.3
	50-64 years	78.5	46.5
	65+ years	85.1	62.2
Race / Ethnicity*	American Indian/Alaska Native, Non-Hispanic**	36.9	21.4
	Asian/Native Hawaiian/Other Pacific Islander, Non-Hispanic	42.6	23.2
	Black, Non-Hispanic	35.7	14.5
	Hispanic	48.2	17.8
	White, Non-Hispanic	49.0	25.8

* 24.3% of the population with a completed primary series of vaccination and 28.0% of the population that has received a booster dose were recorded as “Unknown” or “Other” and therefore population percentages are unable to be calculated for those categories.

** Tribal populations may be underrepresented as the data source does not include Indian Health Services (IHS) data, which may contain vaccination records for tribal members and those who access services through IHS clinics.

Figure 10. Change in Percentage of Population with a Completed Primary Series by Sex, Washoe County, 2021-2022

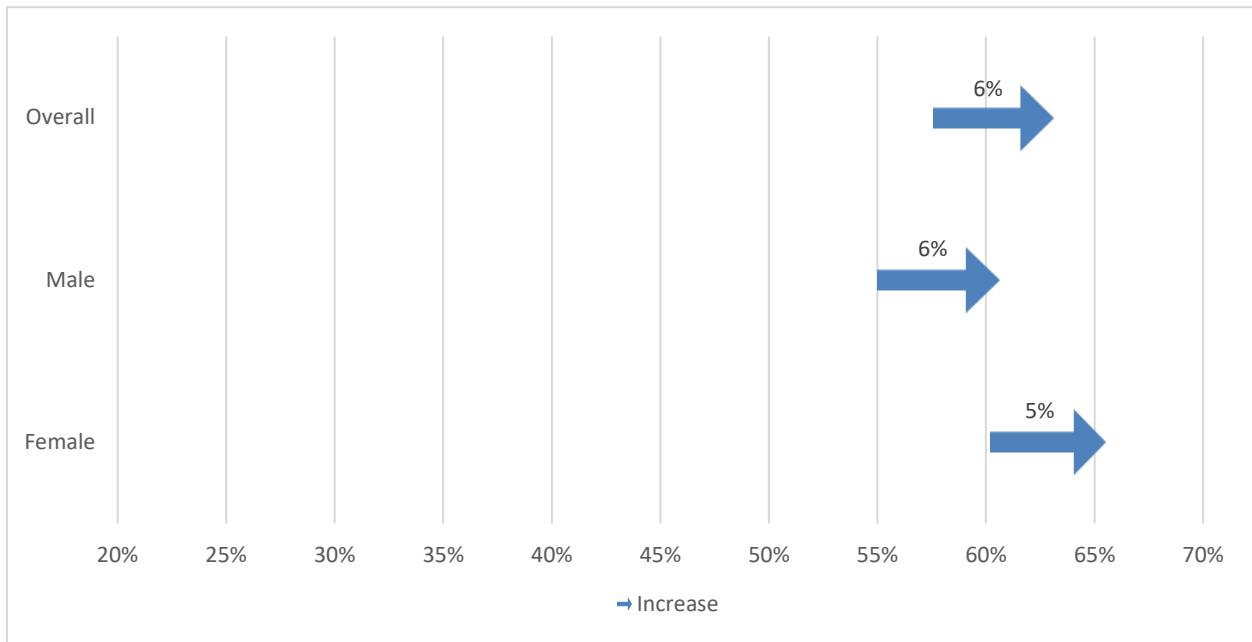


Figure 11. Change in Percentage of Population with a Completed Primary Series by Age Group, Washoe County, 2021-2022

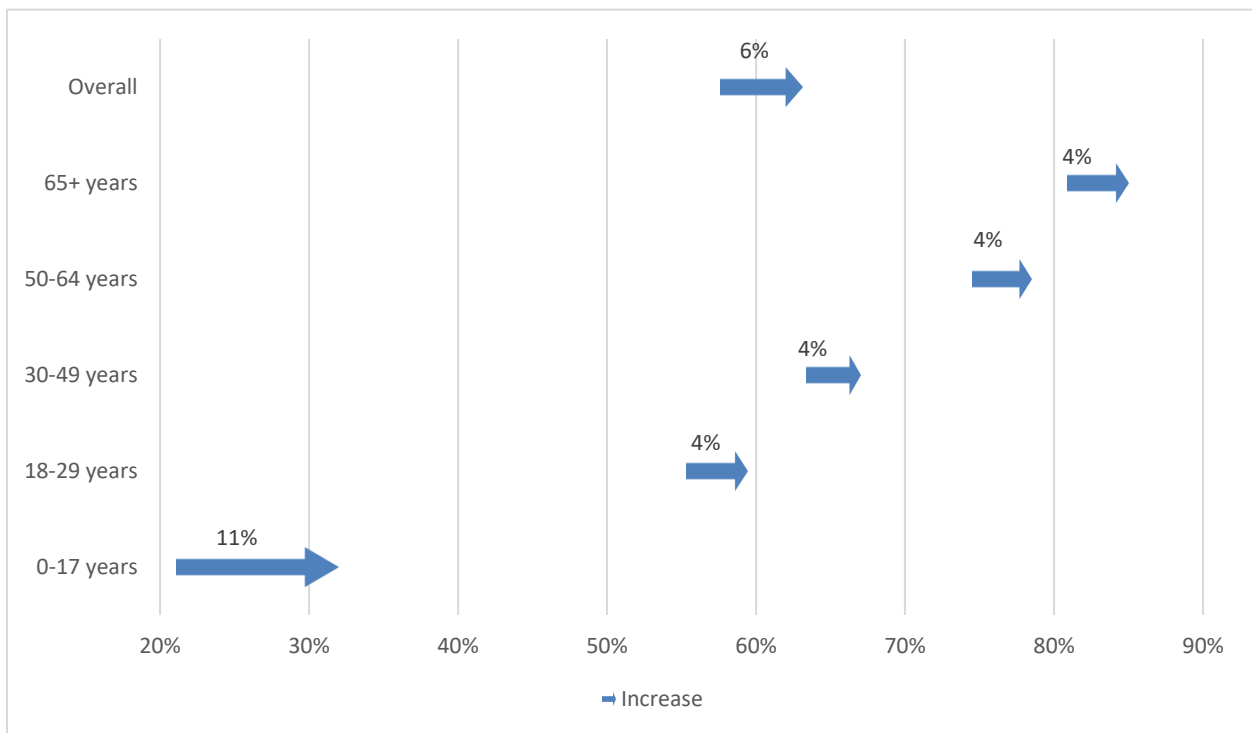
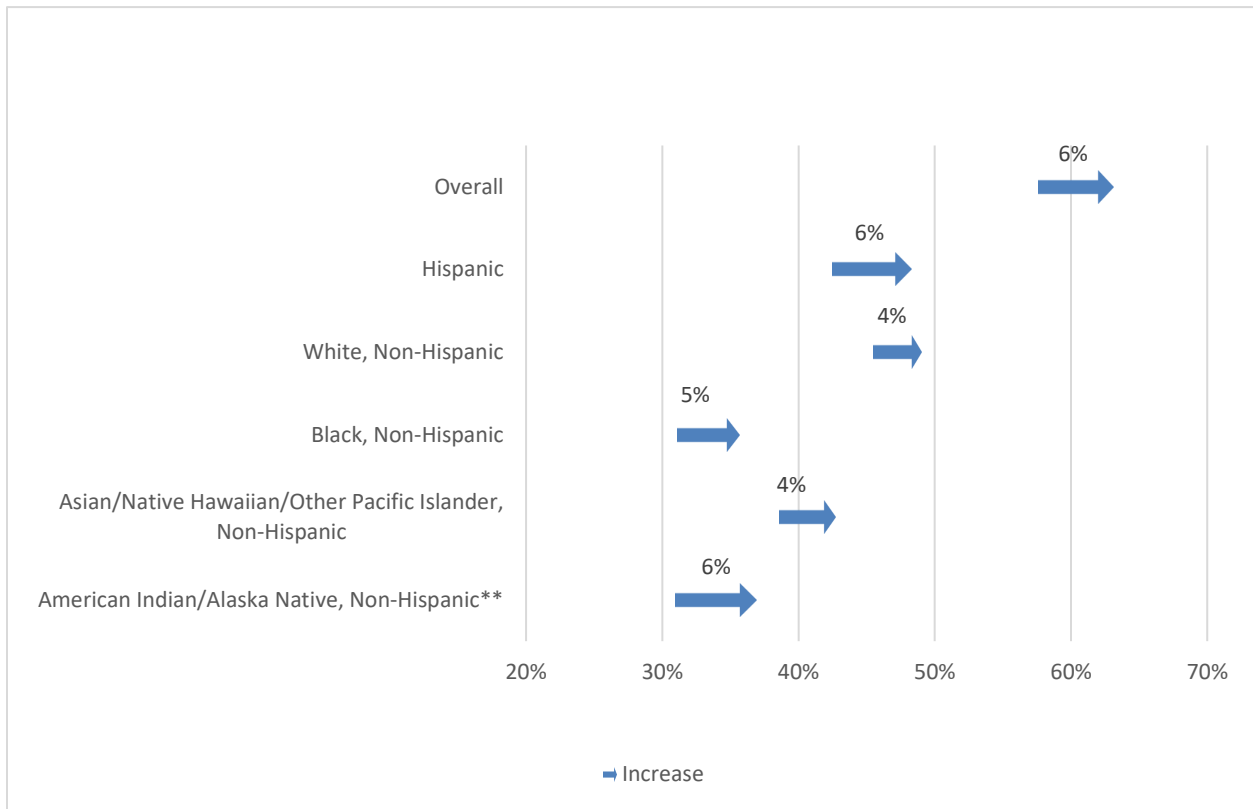


Figure 12. Change in Percentage of Population with a Completed Primary Series by Race/Ethnicity*, Washoe County, 2021-2022



* 24.3% of the population with a completed primary series of vaccination and 28.0% of the population that has received a booster dose were recorded as “Unknown” or “Other” and therefore population percentages are unable to be calculated for those categories.

** Tribal populations may be underrepresented as the data source does not include Indian Health Services (IHS) data, which may contain vaccination records for tribal members and those who access services through IHS clinics.

Hospitalizations

COVID-19 hospitalizations are defined as those hospitalized for greater than or equal to 24 hours and have a positive SARS-CoV-2 laboratory test. If at any point during hospitalization they were admitted to the ICU, they counted as an ICU case.

Prior to the pandemic, the respiratory illness season officially was recognized as starting in October and carrying through the winter months into May. These winter surges occur in part due to people moving indoors and sharing airspace more than summer and fall when outdoor temperatures are warmer and people are engaging in outdoor activities, as well as an increase in holiday related gatherings.

When COVID-19 infections surged, hospital and ICU capacities were tested and reached. Early in the pandemic, officials at the local hospitals prepared for the worst by setting up tents outside their hospitals. One even converted its parking garage into patient care space. In late fall of 2020, the average hospital bed usage was around 90% of capacity and ICUs were at upwards of 85% capacity across the community, according to Nevada Hospital Association (NHA) data for Washoe County.⁷ As the pandemic raged on, the hospitals continued to be inundated and understaffed. NHA data for Washoe County reflected average hospitalization burden spiking again in September of 2021 and remaining at 80-90% hospital capacity and 70-80% ICU capacity through the end of 2022.⁷

The percentage of new cases resulting in hospitalization per month, stratified by age group, is shown in Figure 13. The 65+ age group consistently had the highest percentage of new cases resulting in hospitalization from 2020 through 2022. The 50-64 age group was consistently second highest percentage of new cases resulting in hospitalization until April of 2022 when the 0-17 age group increased and was the second highest through the end of 2022. Figure 14 provides the number new cases and percent hospitalized and admitted to the ICU. There was a higher percentage of new cases hospitalized and admitted to the ICU than during the rest of the pandemic. As time went on, a trend can be seen where the percentage of new cases hospitalized and admitted to the ICU increases as case counts decrease, and vice versa.

⁷ Percentages are 7-day averages. The total number of staffed hospital beds (the denominator) is a monthly average from the previous month and the occupied beds are recorded daily and averaged.

Figure 13. Percent of New Cases Resulting in Hospitalization by Age and Month*, Washoe County, 2020-2022

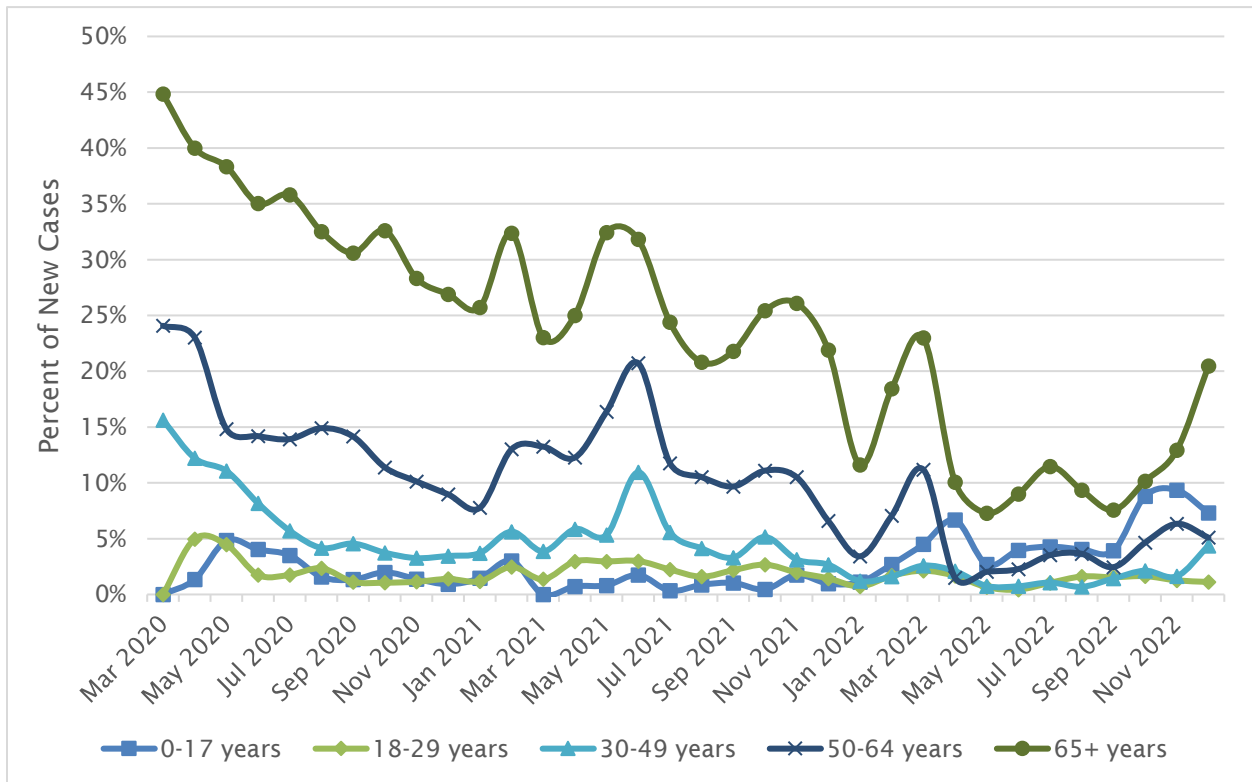
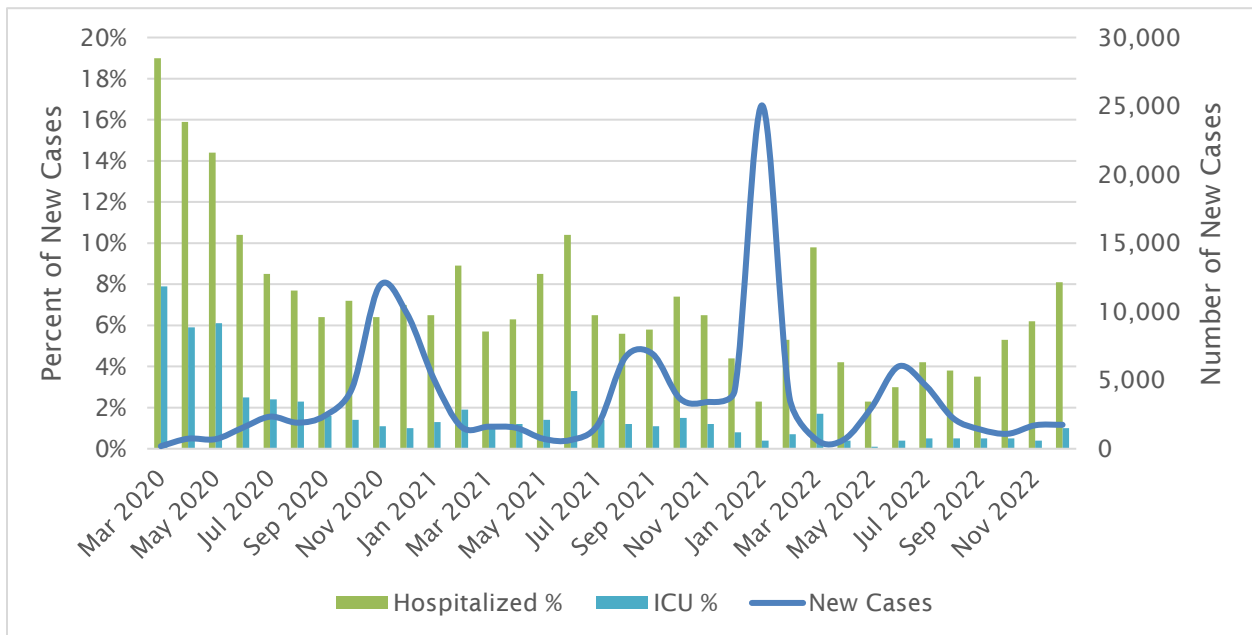


Figure 14. Number and Percentage of Cases Reported by Hospitalization and ICU Status by Month, Washoe County, 2020-2022



Underlying Health Conditions

An underlying health condition (UHC) is a chronic or long-term medical condition or co-occurring illness which is associated with a higher risk for more severe COVID-19 disease. The data in this section are limited by the data collection methods. UHC data are skewed towards hospitalized cases and those who died from COVID-19, as medical records are reviewed to obtain information for reporting UHCs and symptomology for those cases. If a case was not reached for an interview and was not hospitalized, these data may not have been able to be captured and reflected in the data. By comparing hospitalization and ICU admittance between cases that reported having UHC(s) or had UHC(s), trends between illness severity and UHCs can be observed.

From 2020 through 2022, there was a larger percentage of cases that were hospitalized or admitted to the ICU that reported at least one UHC [Table 4]. The top three UHCs among the cases reporting UHCs are “Former Smoker”, “Hypertension”, and “Chronic Lung Disease” at 12.5%, 12.3% and 10.5% of total cases reporting UHCs, respectively. The top three UHCs among the hospitalized cases reporting UHCs are “Former Smoker”, “Diabetes Mellitus”, and “Hypertension” at 41.3%, 29.9%, and 20.7% of hospitalized cases reporting UHCs, respectively [Table 5].

Table 4. Number and Percentage of Cases Reporting Hospitalization and ICU by Underlying Health Condition Status and Month*, Washoe County, 2020-2022

Year	All Cases			No UHC Reported				At Least One UHC Reported			
	New Cases	Total Hospitalized	Total ICU	Hospitalized		ICU		Hospitalized		ICU	
				#	% ^a	#	% ^b	#	% ^a	#	% ^b
2020	35,984	2,691	571	330	12.3	39	6.8	2,361	87.7	532	93.2
2021	37,816	2,355	468	828	35.2	107	22.9	1,527	64.8	361	77.1
2022	51,922	1,745	229	518	29.7	37	16.2	1,227	70.3	192	83.8

^a Calculated as the percentage of Total Hospitalizations (internal record of hospitalization) by underlying health condition status for that timeframe.

^b Calculated as the percentage of Total ICU by underlying health condition status for that timeframe.

Table 5. Number and Percentage of Cases Reporting Each Underlying Health Condition by Hospitalization Status, Washoe County, 2020-2022

Underlying Health Condition	Number of Cases* Reporting UHC	% of Cases* Reporting UHC	% of Hospitalized Cases** Reporting UHC
Yes (one or more)	33,815	46.7	86.3
Former Smoker	9,014	12.5	41.3
Hypertension	8,890	12.3	20.7
Chronic Lung Disease (asthma/emphysema/COPD)	7,610	10.5	20.3
Current Smoker	5,975	8.3	9.6
Diabetes Mellitus	5,672	7.8	29.9
Other Chronic Disease	4,638	6.4	20.4
Other Underlying Condition or Risk Behavior	4,509	6.2	17.1
Psychological or Psychiatric Condition	4,299	5.9	12.3
Cardiovascular Disease	3,742	5.2	20.6
Severe Obesity (BMI >= 40)	2,575	3.6	12.2
Substance Abuse or Misuse	1,688	2.3	7.0
Autoimmune Condition	1,630	2.3	3.9
Chronic Renal Disease	1,508	2.1	12.7
Immunosuppressive Condition	926	1.3	3.5
Chronic Liver Disease	479	0.7	3.2
None	38,534	53.3	13.7

* N = 72,349 total cases where underlying health condition status is known (those who were interviewed or where this information was available in electronic medical records).

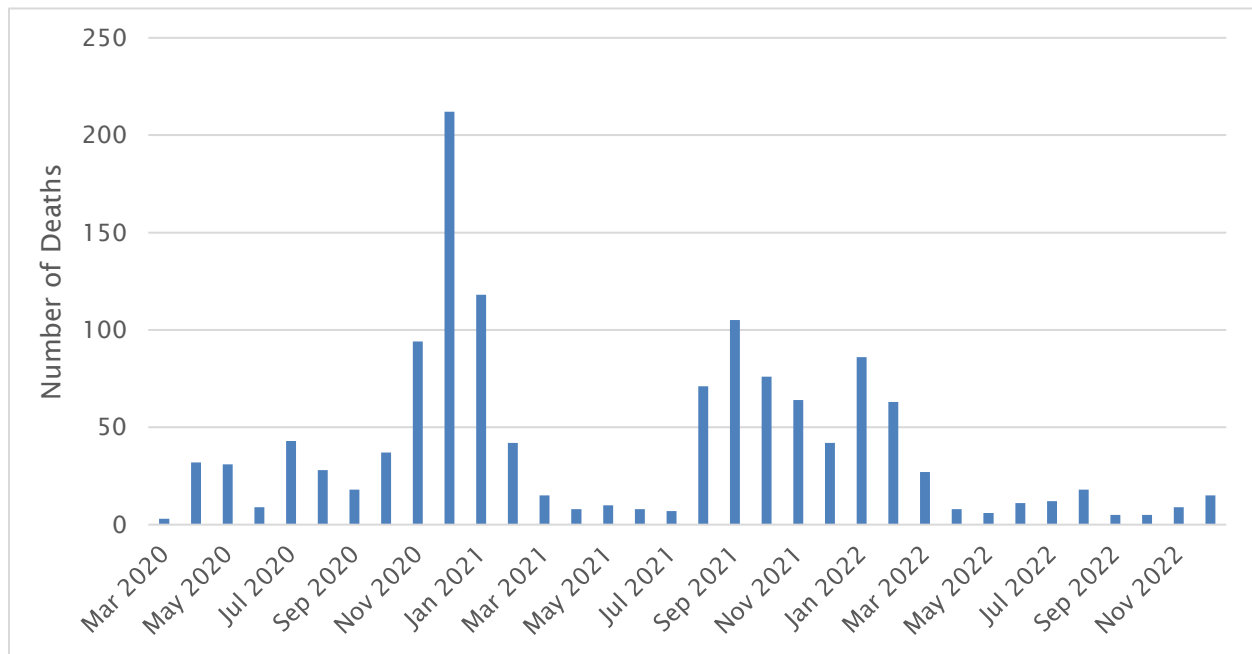
** N = 5,439 total cases where underlying health condition status is known and where there is record of a hospitalization meeting the definition.

Deaths

COVID-19 deaths include deaths attributed to COVID-19 related illnesses and, if not specifically listed on death certificate, a positive COVID-19 test, dependent on the manner of death (see full definition and changes to the definition in Glossary/Key Terms at the end of the report). At the end of 2020 there were not persons vaccinated in Washoe County and considered “Fully Vaccinated”, as an individual is not fully vaccinated until 14 days after completing their primary series of vaccination. Therefore, there were no deaths among vaccinated cases in 2020.

The case fatality rate fluctuated throughout the pandemic. Figure 15 and Table 6 display death counts over time and by stratified by age group respectively, while Table 7 breaks down deaths by vaccination status. Major events from the first three years of the pandemic are mapped over the case fatality rate from March 2020 through the end of 2022 in Figure 16.

Figure 15. Number of Deaths Occurring by Month*, Washoe County, 2020-2022



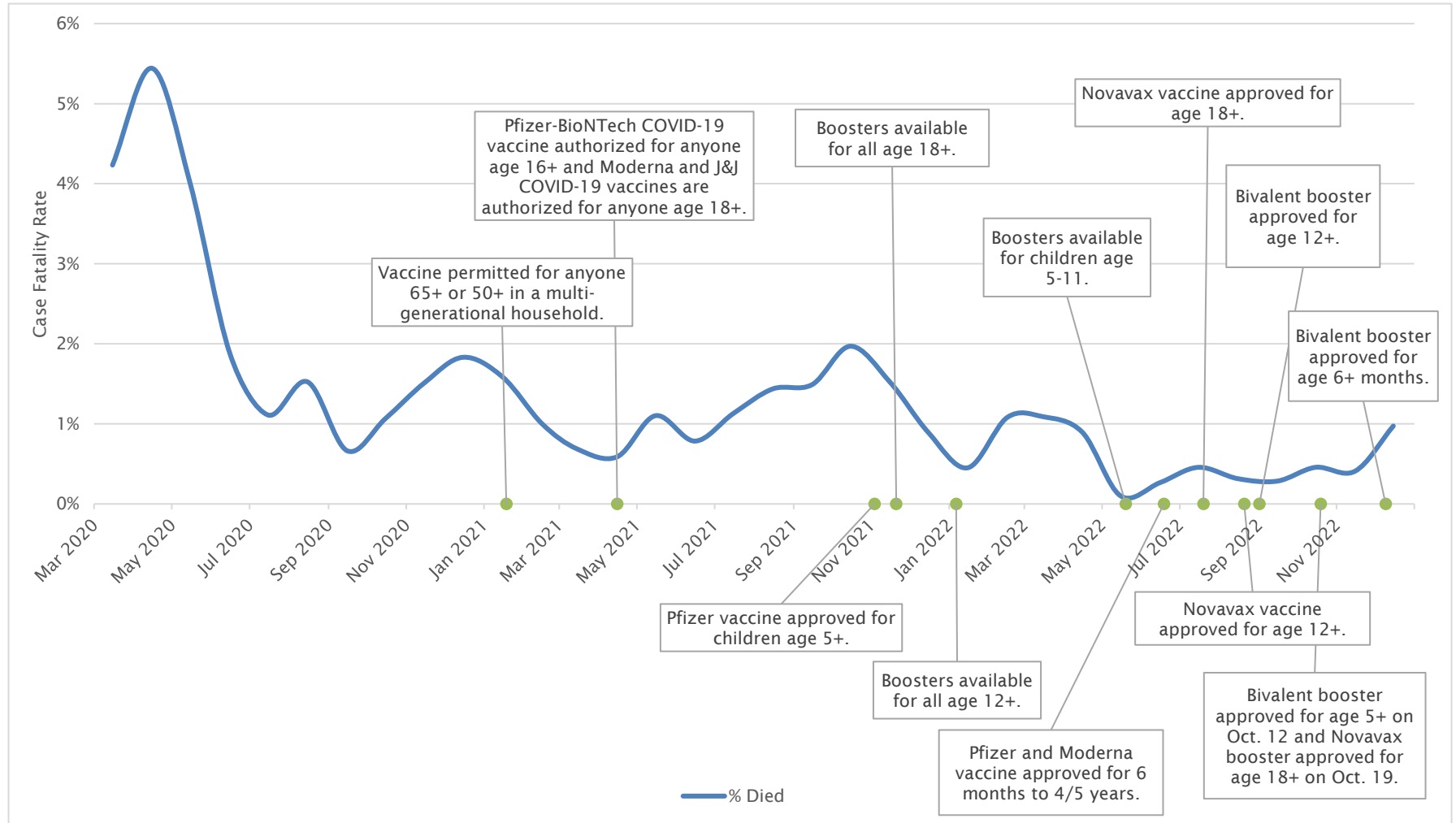
* The month in which the death occurred.

Table 6. COVID-19 Deaths by Age Group and Year*, Washoe County, 2020-2022

Timeframe	Total Deaths	0-17 years	18-29 years	30-49 years	50-64 years	65+ years
2020 March - December	507	1	2	31	85	388
2021 Total	566	2	6	61	128	369
2022 Total	265	0	2	14	37	212

* The year in which the death occurred.

Figure 16. Case Fatality Rate by Month* with Major Vaccine Milestones Documented, Washoe County, 2020-2022



* The date used to document deaths in this figure is the earliest sample collection date for each case.
 Vaccine Timeline Data Source: <https://doh.wa.gov/sites/default/files/2022-02/348-862-VaccineTimeline.pdf>

Table 7. Percentage of New Deaths* by Vaccination Status Each Month, Washoe County, 2020-2022

Quarter	Number of Deaths	% of Deaths Among Unvaccinated Persons	% of Deaths Among Persons who Completed a Primary Series	% of Deaths Among Persons with a Booster Dose
March - June 2020**	75	100.0	0.0	0.0
July - September 2020	89	100.0	0.0	0.0
October - December 2020	343	100.0	0.0	0.0
January - March 2021	175	100.0	0.0	0.0
April - June 2021	26	96.2	3.8	0.0
July - September 2021	183	83.1	16.9	0.0
October - December 2021	182	80.2	17.6	2.2
January - March 2022	176	61.9	29.0	9.1
April - June 2022	25	32.0	40.0	28.0
July - September 2022	35	28.6	22.9	48.6
October - December 2022	29	41.4	10.3	48.3

* The date used to document deaths in this table is the date of death.

** The first quarter in this table includes March, as the first death in Washoe County did not occur until March 27, 2020.

Breakthrough Cases

A breakthrough COVID-19 case is defined as a person who has tested positive for SARS-CoV-2 or has a symptom onset 14 or more days after completing the primary series of an FDA-authorized COVID-19 vaccine. Therefore, breakthrough case data are restricted to 2021 and 2022 as there were not any individuals in Washoe County who were considered fully vaccinated in 2020. By tracking the prevalence of breakthrough cases, the longevity and effectiveness of the immunity provided by vaccine can be better understood. When evaluated over time and comparing the hospitalization and ICU data between unvaccinated cases and breakthrough cases, it is clear that vaccination provides protection from severe disease.

Increases in breakthrough cases became more common as the majority of persons were able to be vaccinated [Figure 18]. By December 2021, 41.4% of new cases were breakthrough cases in individuals who had completed their primary series and 7.6% of new cases were breakthrough cases in individuals who had received a booster dose. By the end of 2022, 24.3% of new cases were breakthrough cases in individuals who had completed their primary series and 36.9% of new cases were breakthrough cases in individuals who had received a booster dose.

Figure 19 shows the highest percentage of breakthrough infections (17.5%) occurred greater than 10 months since last dose of vaccine. The second highest percentage of breakthrough infections (11.3%) occurred 7-8 months since last dose of vaccine.

Figure 17. Number of Breakthrough Infections by Day Over the Detection of New Variants, Washoe County, 2021-2022

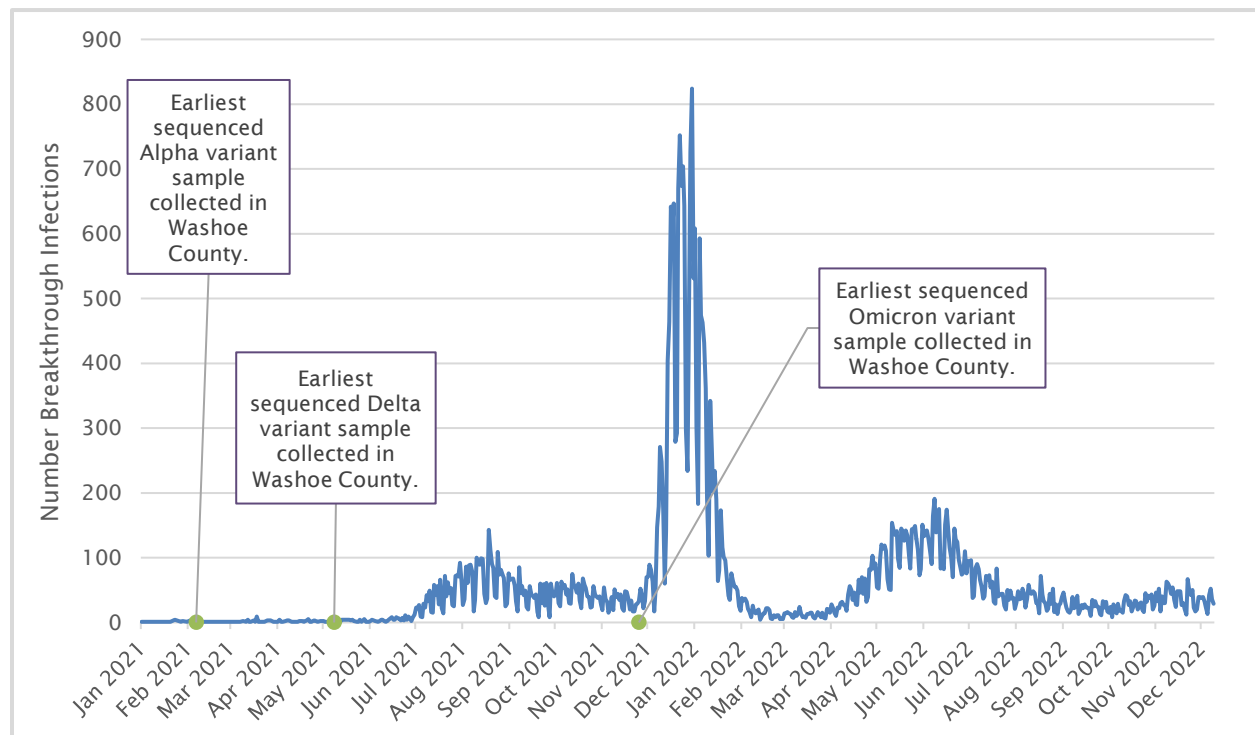


Figure 18. Percentage of Cases per Month by Vaccination Status, Washoe County, 2020-2022

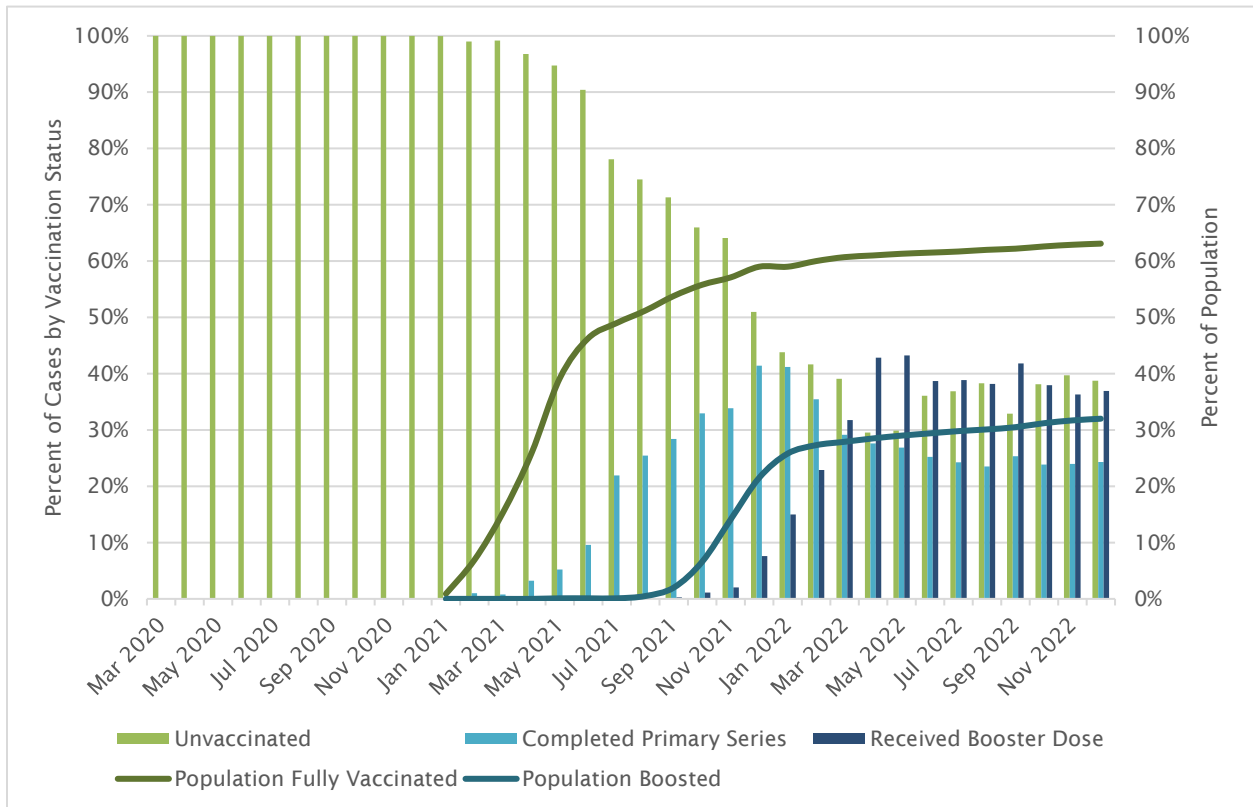
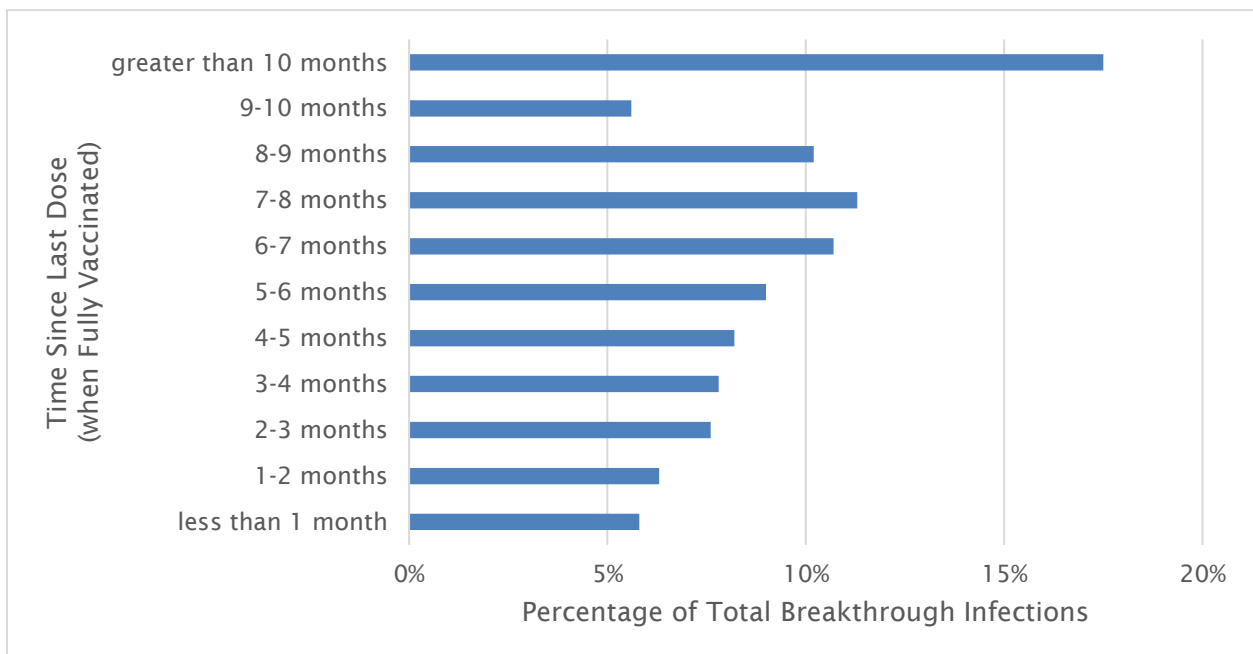


Figure 19. Percentage of Total Breakthrough Infections* by Time Since Last Dose of Vaccine to COVID-19 Infection, Washoe County, 2020-2022



* Breakthrough case total is 39,938 cases.

Table 8. Number and Percentage of Cases Reporting Hospitalization and ICU by Vaccination Status and Month, Washoe County, 2021-2022

Month	All Cases			Unvaccinated Cases				Breakthrough Cases			
	New Cases	Number Hospitalized	Number in ICU	Hospitalized		ICU		Hospitalized		ICU	
				#	% ^a	#	% ^b	#	% ^a	#	% ^b
Jan 2021	5,041	329	66	329	100.0	66	100.0	0	0.0	0	0.0
Feb 2021	1,597	142	30	141	99.3	30	100.0	1	0.7	0	0.0
Mar 2021	1,609	91	17	91	100.0	17	100.0	0	0.0	0	0.0
Apr 2021	1,528	96	18	89	92.7	18	100.0	7	7.3	0	0.0
May 2021	726	62	10	59	95.2	10	100.0	3	4.8	0	0.0
Jun 2021	637	66	18	60	90.9	16	88.9	6	9.1	2	11.1
Jul 2021	1,773	115	25	106	92.2	22	88.0	9	7.8	3	12.0
Aug 2021	6,683	372	79	290	78.0	67	84.8	82	22.0	12	15.2
Sep 2021	6,909	401	79	314	78.3	59	74.7	87	21.7	20	25.3
Oct 2021	3,655	271	53	204	75.3	44	83.0	67	24.7	9	17.0
Nov 2021	3,415	223	40	158	70.9	35	87.5	65	29.1	5	12.5
Dec 2021	4,243	187	33	124	66.3	27	81.8	63	33.7	6	18.2
Jan 2022	25,051	572	92	331	57.9	52	56.5	241	42.1	40	43.5
Feb 2022	3,798	201	26	110	54.7	17	65.4	91	45.3	9	34.6
Mar 2022	642	63	11	37	58.7	5	45.5	26	41.3	6	54.5
Apr 2022	670	28	3	16	57.1	2	66.7	12	42.9	1	33.3
May 2022	2,983	68	4	27	39.7	2	50.0	41	60.3	2	50.0
Jun 2022	6,009	179	22	76	42.5	12	54.5	103	57.5	10	45.5
Jul 2022	4,597	194	24	88	45.4	10	41.7	106	54.6	14	58.3
Aug 2022	2,218	85	10	46	54.1	7	70.0	39	45.9	3	30.0
Sep 2022	1,402	49	7	19	38.8	4	57.1	30	61.2	3	42.9
Oct 2022	1,093	58	6	24	41.4	3	50.0	34	58.6	3	50.0
Nov 2022	1,712	106	6	53	50.0	3	50.0	53	50.0	3	50.0
Dec 2022	1,747	142	18	66	46.5	11	61.1	76	53.5	7	38.9

^a Calculated as the percentage of Total Hospitalizations by vaccination status for the month.

^b Calculated as the percentage of Total ICU by vaccination status for the month

Reinfections

When persons with a healthy, functioning immune system are infected with SARS-CoV-2, an immune response will occur and one of the markers is the development of antibodies, which are able to recognize the virus if exposed later and should then trigger a full immune system response to prevent becoming ill with the same virus. Unfortunately, these antibodies are not always effective at preventing additional infections with SARS-CoV-2, largely due to mutations in the virus enough so that the immune system's antibodies are unable to recognize the virus when exposed later to a mutated version. Reinfections are determined by multiple criteria, including but not limited to length of time between infections, age, underlying health conditions, complete symptom resolution between infections, and/or new source of exposure, in addition to whole genome sequencing data which can prove infections due to distinct variants.

Washoe County Health District, in collaboration with the NSPHL, identified the first COVID-19 reinfection case in the United States. In an [article](#) published in October 2020, the reinfection of a 25-year-old Washoe County resident was described. The man presented, on two separate occasions in mid-2020 (April and June), seven weeks apart, with symptoms of COVID-19 illness. On both occasions the case was sampled, and nucleic acid amplification testing was performed to confirm the second infection. The case had two negative tests between the two positive tests and the second infection was presenting as symptomatically more severe than the first. Using whole genome sequencing and genomic analysis, the two samples were determined to be genetically distinct viruses, i.e., two separate infections.⁸

Evaluating and investigating reinfection cases more thoroughly provides insight into immunity conferred by infection and immune-evasive properties of the SARS-CoV-2 virus.

⁸ Tillett RL, Sevinsky JR, Hartley PD, Kerwin H, Crawford N, Gorzalski A, Laverdure C, Verma SC, Rossetto CC, Jackson D, Farrell MJ, Van Hooser S, Pandori M. Genomic evidence for reinfection with SARS-CoV-2: a case study. *Lancet Infect Dis.* 2021 Jan;21(1):52-58. doi: 10.1016/S1473-3099(20)30764-7. Epub 2020 Oct 12. PMID: 33058797; PMCID: PMC7550103.

Figure 20. Number of Reinfections by Day Over the Detection of New Variants, Washoe County, 2020-2022

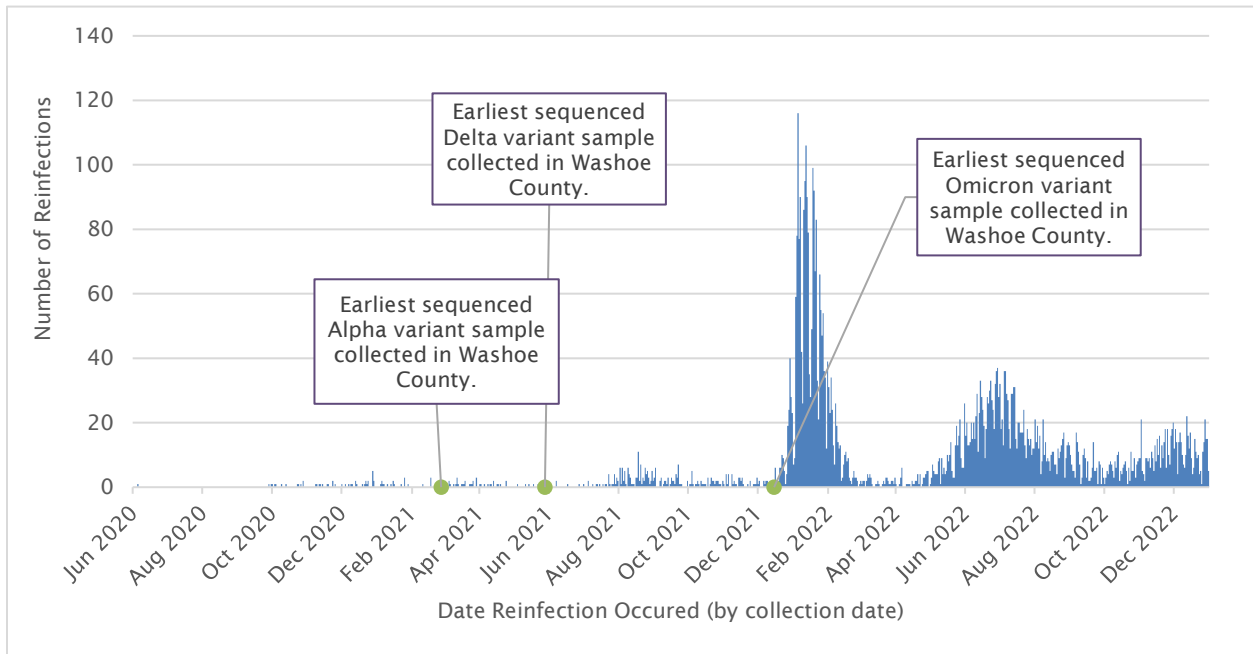


Figure 21. Time Between Infection for Reinfection Cases, Washoe County, 2020-2022

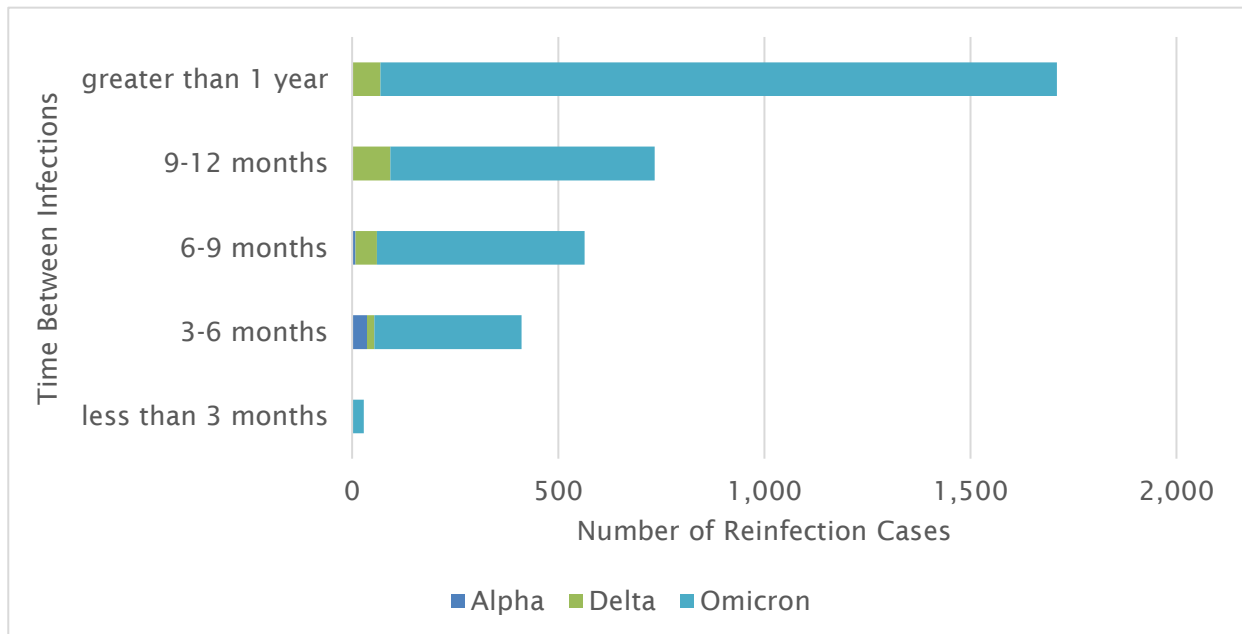


Table 9. Total Infections by the Number of Times a Person was Infected, Washoe County, 2020-2022

Total Infections (2020-2022)	# of Infections	Total*
125,722*	1	114,175
	2	5,624
	3	97
	4	2

*Total: $114,175 \times 1 + 5,624 \times 2 + 97 \times 3 + 4 \times 2 = 125,722$ total infections

HBV/HCV Coinfection

COVID-19-related hepatic complications are concerning among people living with chronic hepatitis C viral infection (HCV), chronic hepatitis B virus infection (HBV), or HBV/HCV coinfection with pre-existing liver complications (e.g., cirrhosis, liver failure, hepatocellular carcinoma). A systematic review published in 2020 suggests that severe COVID-19 cases (i.e., those admitted to intensive care unit [ICU]) could lead to liver injuries and elevated alanine aminotransferase (ALT), aspartate aminotransferase (AST), and total bilirubin. Abnormal liver functions among COVID-19 patients have been associated with increased disease severity and mortality risk.⁹

A data linkage was conducted with HBV and HCV registries maintained by Washoe County Health District's (WCHD) Epidemiology Program and Washoe County COVID-19 cases reported from March 2020 to August 2021.

HBV Epidemiology and Prevalence of COVID-19 Cases coinfecting with HBV

Hepatitis B virus (HBV) is transmitted from person to person through percutaneous or mucosal contact with infectious blood or body fluids. Five percent (5%) of adults with acute HBV infection will develop chronic HBV infection, while 90% of infants infected with HBV will remain chronically infected. An estimated 850,000 – 2.2 million persons in the United States have chronic HBV infection and are a reservoir for transmission of HBV.¹⁰

WCHD received a total of 1,830 chronic HBV case reports between 1990 to 2019. The data match was conducted between 47,008 Washoe County COVID-19 cases and the HBV cases, resulting in identification of 0.2% (n = 70) of COVID-19 cases co-infected with HBV.

Of the 70 coinfecting cases, 40% (n = 28) were among those aged 50-59 years, and 55.7% (n = 39) were female [Table 10]. Information on race/ethnicity was available for 66 of the 70 coinfecting cases. Of those 66 cases, 62.1% (n = 41) belonged to Asian, Native Hawaiian, or Pacific Islanders, non-Hispanic, followed by White, non-Hispanic 16.7% (n = 11), and Hispanic 16.7% (n = 11) [Table 10]. The percent of COVID-19 cases with HBV hospitalized was 21.4% (n = 15) compared to COVID-19 cases without HBV at 7.7% (n = 3604) (P-value = 0.0001) [Table 11]. Among COVID-19 cases with HBV, 35% (n = 7), while 6.3% (n = 723) of COVID-19 cases without HBV were admitted to the ICU (P-value = 0.0001) [Table 11]. COVID-19 cases with HBV coinfection in Washoe County had significantly higher hospitalization and ICU admission than the COVID-19 cases without HBV coinfection [Table 11].

9 Mirzaie, H., Vahidi, M., Shokoohi, M., Darvishian, M., Sharifi, H., Sharafi, H., & Karamouzian, M. (2021, January 9). COVID-19 among patients with Hepatitis B or Hepatitis C: A systematic review. *Hepatitis Monthly*. Retrieved September 29, 2021, from <https://sites.kowsarpub.com/hepatmon/articles/111617.html>.

10 Washoe County Health District, Division of Epidemiology and Public Health Preparedness. (2016). 2016 Annual Communicable Disease Summary. Reno, NV

Table 10. COVID-19 cases with Hepatitis B by Age, Sex, Race/Ethnicity, Washoe County, March 2020–August 2021

Select Demographics		COVID-19 HBV matched cases		Population %	Ratio*
		#	%		
Age Group	0-19 years	0	0.0	25.6	0.0
	20-29 years	6	8.6	14.0	0.6
	30-39 years	9	12.9	13.8	0.9
	40-49 years	19	27.1	11.9	2.3
	50-59 years	28	40.0	12.0	3.3
	60+ years	8	11.4	22.7	0.5
Sex	Male	31	44.3	49.8	0.9
	Female	39	55.7	50.2	1.1
Race / Ethnicity**	American Indian/Alaska Native, non-Hispanic ^a	1	1.5	1.6	-
	Asian/Native Hawaiian/Pacific Islander, non-Hispanic	41	62.1	7.2	8.6
	Black, non-Hispanic ^b	2	3.0	2.6	-
	White, non-Hispanic	11	16.7	62.2	0.3
	Hispanic	11	16.7	26.5	0.6

* Ratio of >1 represents that the sub-group has higher than expected cases, and <1 represents that the sub-group has lower than expected cases. Ratio is calculated by dividing the total percent of health events for the specific sub-group of interest by the total percent of the population in that sub-group.

** 4 cases had missing values, multiple, or unknown for Race and Ethnicity

^{a,b} American Indian/Alaska Native, Black had one and two cases, respectively, so ratios were not calculated for them as ratios can be misleading for such small numbers.

Table 11. Demographic and Clinical Characteristics of COVID-19 Cases with HBV vs. COVID-19 Cases without HBV, Washoe County, March 2020–August 2021

Variables	With HBV (N=70)	Without HBV (N=46,938)	P-value
Age ^a	n= 70	n=46,914	
Average±SD	48.3 ±11.3	39.3 ±19.4	<0.0001*
Sex ^b	n= 70	n=46,933	
Male n (%)	31 (44.3)	23100 (49.2)	0.4732
Hospitalization ^b	n= 70	n=46,938	
Yes n (%)	15 (21.4)	3604 (7.7)	<0.0002*
ICU ^c	n=20	n=11,567	
Yes n (%)	7 (35.0)	723 (6.3)	<0.0001*
Death ^c	n=19	n=14,938	
Yes n (%)	2 (10.5)	689 (4.6)	0.2182

^a Calculated using Student's t-test

^b Calculated using Chi-square test

^c Calculated using Fisher's Exact test

*Indicates statistically significant P-values

HCV Epidemiology and Prevalence of COVID-19 Cases coinfecting with HCV

Hepatitis C virus (HCV) infection is the most common chronic blood-borne infection in the United States. This virus usually is transmitted primarily through large or repeated percutaneous exposures to blood – for example, through sharing of equipment between persons who inject drugs. Approximately 75% - 85% of persons with acute HCV infection will develop chronic HCV infection. An estimated 3.5 million persons in the United States have chronic HCV infection.¹⁰

WCHD received a total of 13,122 positive HCV test reports between May 1, 2002, and December 2020. Of the 13,122 lab reports, 78.9% (n = 10,355) were Washoe County residents. A data match was conducted between the 47,008 Washoe county COVID-19 cases and the HCV cases, resulting in 0.7% (n = 333) of COVID-19 cases co-infected with HCV.

Of the 333 coinfecting cases, 48.9% (n = 163) cases were found among the people ≥ 60 years, and 61.6% (n = 205) of the cases were male. For 309 coinfecting cases, information on race/ethnicity was available [Table 13]. Of those 309 cases, 78.6% (n = 243) cases were White, non-Hispanic, 5.2% (n = 16) were African American, non-Hispanic, and 13.1% (n = 41) were Hispanic [Table 13]. The average age for COVID-19 cases with HCV coinfection was significantly higher than the COVID-19 cases without HCV coinfection [Table 14]. COVID-19 cases with HCV coinfection in Washoe County had significantly higher proportion of cases resulting in hospitalization, ICU admission, and death than the COVID-19 cases without HCV coinfection [Table 14].

Table 12. Case Classification for COVID-19-HCV Cases, Washoe County, March 2020–August 2021

Case Classification	# Cases	% Cases
Acute Hepatitis C	4	1.2
Confirmed Hepatitis C	264	79.3
Probable Hepatitis C	43	12.9
Unable to classify*	22	6.6
Total	333	100.0

* Unable to classify: an old WCHD classification that was used until 2015. Unable to classify was used for the patient who was an HCV case but could not be classified as a confirmed or probable case based on CDC's case definition.

Table 13. COVID-19 Cases with HCV by Age, Sex, Race and Ethnicity, Washoe County, March 2020–August 2021

Select Demographics		COVID-19 HCV Matched Cases		Population %	Ratio*
		#	%		
Age Group	0-19 years	0	0	25.6	0.0
	20-29 years	9	2.7	14.0	0.2
	30-39 years	33	9.9	13.8	0.7
	40-49 years	40	12.0	11.9	1.0
	50-59 years	88	26.4	12.0	2.2
	60+ years	163	49.0	22.7	2.2
Sex	Male	205	61.6	49.8	1.2
	Female	128	38.4	50.2	0.8
Race / Ethnicity**	American Indian/Alaska Native, Non-Hispanic ^a	8	2.6	1.6	1.7
	Asian/Native Hawaiian/Pacific Islander, Non-Hispanic ^a	1	0.3	7.2	-
	Black, Non-Hispanic	16	5.2	2.6	2.0
	White, Non-Hispanic	243	78.6	62.2	1.3
	Hispanic	41	13.3	26.5	0.5

* Ratio of >1 represents that the sub-group has higher than expected cases, and <1 represents that the sub-group has lower than expected cases. Ratio is calculated by dividing the total percent of health events for the specific sub-group of interest by the total percent of the population in that sub-group.

**24 cases had missing values, multiple, or unknown for Race and Ethnicity

^aAsian/Native Hawaiian/Pacific Islander, non-Hispanic had one case, so ratio was not calculated for this group as ratio can be misleading for such a small number.

Table 14. Demographic and Clinical Characteristics of COVID-19 with HCV Cases vs. without HCV, Washoe County, March 2019–August 2021

Variables	With HCV(N=333)	Without HCV(N=46,651)	P-value
Age ^a	n=333	n=46,651	
Average±SD	56.6±12.7	39.2±19.4	<0.0001*
Sex ^b	n=333	n=46,670	
Male n (%)	205 (61.6)	22927 (49.1)	<0.0001*
Hospitalization ^b	n= 333	n= 46,675	
Yes n (%)	89 (26.7)	3530 (7.6)	<0.0001*
ICU ^c	n=99	n=11,488	
Yes n (%)	21 (21.2)	709 (6.2)	<0.0001*
Death ^c	n=113	n=14845	
Yes n (%)	11 (9.7)	680 (4.6)	0.02

^aCalculated using Student's t-test

^bCalculated using Chi-square test

^cCalculated using Fisher's Exact test

*Indicates statistically significant P-values

HIV Coinfection

Human immunodeficiency virus (HIV) is a virus that attacks the immune system and is often transmitted through vaginal or anal sex, or from sharing needles or syringes. If left untreated can progress to Stage 3 HIV. However, people can live a long time with the effect treatments available. Symptoms are flu-like and usually are experienced within the first two to four weeks after infection.¹¹

Using demographic information and socioeconomic status of populations affected by COVID-19 in Washoe County and utilizing annual COVID-19 surveillance data and HIV surveillance data, the health effects of people infected with COVID-19 who are also infected with HIV was assessed. COVID-19 data from March 2020 through September 15, 2021, was exported from the local database. Of the 58,535 positive Washoe County COVID-19 cases reported through September 15, 2021, 94 were identified to be coinfecting with HIV.

The results of the Chi-square test listed in Table 15 illustrates of all the variables included in the analyses, age category, sex, and race provided statistically significant results with the p-value of <0.0001 .

The COVID-19 and HIV linkage study showed that age category, sex, and race were statistically significant. This suggests that age, sex, and race status are possibly related to risk factors of coinfection with SARS-CoV-2 and HIV [Table 15].

11 Center for Disease Control and Prevention. HIV. <https://www.cdc.gov/hiv/default.html>. Reviewed July 14, 2023.

Table 15. Characteristics of Variables by Coinfection and Non-Coinfection Status of HIV and COVID-19 in Washoe County

Select Demographics		Coinfection (N=94)	Non-Coinfection (N=58,441)	p-value
Age Group	0-19 years	0	9,396	<.0001
	20-29 years	14	13,107	
	30-39 years	21	10,514	
	40-49 years	17	8,286	
	50-59 years	33	7,733	
	60+ years	9	9,405	
Sex	Male	86	28,781	<.0001‡
	Female	8	29,596	
	Missing	0	64	
Ethnicity	Hispanic	29	18,589	0.3311‡
	Non-Hispanic	65	33,545	
	Missing	0	6,307	
Race	Black	11	1,583	<.0001‡
	White	67	41,608	
	Other	10	7,922	
	Missing	6	7,328	
Died	Yes	0	794	*
	No	94	57,647	
Homeless	Yes	1	179	*
	No	93	58,262	
Asymptomatic	Yes	3	2,712	*
	No	91	55,728	
	Missing	0	1	
ICU	Yes	1	776	*
	No	93	57,665	
Vaccine	Yes	8	4,028	0.5361
	No	86	54,413	
Reinfection	Yes	0	143	*
	No	94	58,297	
	Missing	0	1	
Comorbidity	Yes	94	9,101	*
	No	0	39,240	
	Missing	0	10,100	
Hospitalization	1-3 days	5	1,399	0.1620‡
	4-10 days	2	1,280	
	10+ days	0	871	
	No hospitalization	87	54,891	

‡ Chi-square test excludes missing data

* Statistical significance unavailable due to small numbers of subjects

Limitations

The COVID-19 case data in this report are limited to the cases that were tested for COVID-19 through medical supervision and/or through a certified laboratory and had test results reported to Washoe County Health District. At-home tests are not reportable in the United States or documented and therefore not included.

In analyses aggregated by race/ethnicity, cases with race/ethnicity recorded as “Declined to answer”, “Other”, “Multiple”, “Unknown”, or had multiple listed were excluded from analyses.

The vaccination data are limited to the statewide vaccine database (WebIZ) and cases who were successfully interviewed. Cases who moved to Washoe County from out of state may not have vaccination records in Nevada, limiting these analyses. Additionally, tribal populations may be underrepresented in immunization data, as the data source does not include Indian Health Services (IHS) data, which may contain vaccination records for tribal members and those who access services through IHS clinics.

Variations in sequencing data reported by both state and private laboratories conducting sequencing and how variants were documented are limitations of the variant analyses in this report.

Limitations of the HBV and HCV analysis include unknown HBV and HCV status at time of COVID-19 infection; the association tests were performed on unadjusted data causing certain populations to be over-represented due to data collection practices; cases with only HBV or only HCV were not evaluated for additional compound chronic conditions, therefore these findings are not generalizable to all patients living with HBV or HCV who develop COVID-19 infection. Additionally, the growing nature of COVID-19 and its influence on the healthcare system would have impacted the identification of HBV and HCV infections during 2020 and 2021, resulting in underestimating HBV and HCV comorbidity among COVID-19 patients.

Similarly, the HIV co-morbidity analyses are limited by small sample size causing lack of statistical power, as well as missing fields and inconsistencies in surveillance data.

Dedication

This report is dedicated to those public health professionals who responded to the call to action without question and returned to their jobs without recognition. There was no daily applause for them at the end of their shifts and little celebration of their efforts once they returned to their normal duties. I thank them for their time spent with the Epidemiology Program, for without them our response in Washoe County would not have been possible.

- Heather Kerwin, Epidemiology Program Manager

Glossary/Key Terms

Data

Unless otherwise noted, data in this report are based on symptom onset date (when available or applicable), otherwise sample collection date is used. The primary source of data for this report is Washoe County Health District's internal database. The Nevada State Demographer's data were used for 2020, 2021, and 2022 population and demographics for Washoe County in this report.

COVID-19 Case

Coronavirus disease 2019 (COVID-19) cases counted in this document are confirmed or probable cases as determined by meeting confirmatory laboratory evidence, clinical criteria, and/or epidemiologic linkage as defined on the CDC website here:

<https://ndc.services.cdc.gov/case-definitions/coronavirus-disease-2019-2021/>

COVID-19 Hospitalization

COVID-19 hospitalizations are counted as those hospitalized for greater than or equal to 24 hours and have a positive SARS-CoV-2 laboratory test.

COVID-19 Death

Prior to January 1, 2022, COVID-19 associated deaths were defined as:

- Decedents with a positive PCR COVID-19 lab report (≤ 30 days from death or post-mortem)
- Decedents with a death certificate that lists a COVID-19-related term as a cause of death in Part I and have a history of a positive PCR COVID-19 lab report or COVID-related terms include names for COVID-19, such as SARS-CoV-2, coronavirus, coronavirus-19, etc.
- Decedents with a pending cause of death that had a positive PCR lab test within 30 days of death AND symptoms indicative of COVID-19 (per investigation or medical report)
- Decedents with a death certificate that does not specifically list a COVID-19-related term that had a positive PCR lab result ≤ 30 days before death and/or died within 30 days of COVID-19 symptom onset AND died in a manner of death deemed to be 'natural' on the death certificate.

Exception: Deaths due to non-natural causes (e.g., accidental, intentional self-harm, homicide) should not be counted as a COVID-19 death even if the deceased had a confirmatory positive lab test within 30 days of death

As of January 1, 2022, both Confirmed and Probable COVID-19-associated deaths are included in the count.

- (https://cdn.ymaws.com/www.cste.org/resource/resmgr/pdfs/pdfs2/20211222_interim-guidance.pdf)

Criteria for confirmed case death:

- The case meets the confirmed COVID-19 surveillance case definition, AND at least ONE of the following criteria is met:
 - A case investigation determined that COVID-19 was the cause of death or contributed to the death.
 - The death certificate indicates COVID-19 or an equivalent term as one of the causes of death, regardless of the time elapsed since specimen collection of the confirmatory laboratory test used to define the case.
 - The death occurred within (and including) 30 days of specimen collection for the confirmatory laboratory test used to define the case and was due to natural causes (e.g., the Manner of Death is coded as “natural” on the death certificate.)

Criteria for probable case death:

- The case meets the probable COVID-19 case definition AND a case investigation determined that COVID-19 was the cause of death or contributed to the death; **OR**
- The case meets the probable COVID-19 surveillance case definition based on presumptive laboratory evidence AND death occurred within (and including) 30 days of specimen collection and was due to natural causes (e.g., the Manner of Death is coded as “natural” on the death certificate.); **OR**
- The case meets the probable COVID-19 surveillance case definition based on epidemiologic linkage and meeting clinical criteria, AND death occurred within (and including) 30 days of symptom onset and was due to natural causes (e.g., the Manner of Death is coded as “natural” on the death certificate.); **OR**
- The case meets the probable COVID-19 surveillance case definition based only on vital records criteria (i.e., a death certificate that lists COVID-19 disease or SARS-CoV-2 or an equivalent term as an underlying cause of death or a significant condition contributing to death and there is no confirmatory or presumptive laboratory evidence.)

Links

WCHD COVID Dashboard

<https://washoe.maps.arcgis.com/apps/dashboards/0db36fa8fa9c47758bc38210e4c23818>

WCHD website for COVID information and vaccine appointments

<https://covid19washoe.com/>

WCHD COVID reports <https://covid19washoe.com/daily-updates/washoe-county-covid-19-data-report/>

CD Annual Report for 2021

https://www.washoecounty.gov/health/files/ephp/communicable-diseases/annual-summary/Publication_Final.pdf