Arkansas Public Health Pandemic Working Group
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COVID-19 Forecasts, Projections, and Impact Assessments

The University of Arkansas for Medical Sciences' (UAMS) Fay W. Boozman College of Public Health (COPH) faculty conducted four types of assessments for this month's report: 1) a look at the pandemic in Arkansas from a longer-term perspective; 2) forecasts and projections of cases and maps of community spread; 3) forecast models of hospitalizations; and 4) forecast models of COVID-19 deaths.

All forecasts and projections were developed using COVID-19 data from the Arkansas Department of Health through April 10.

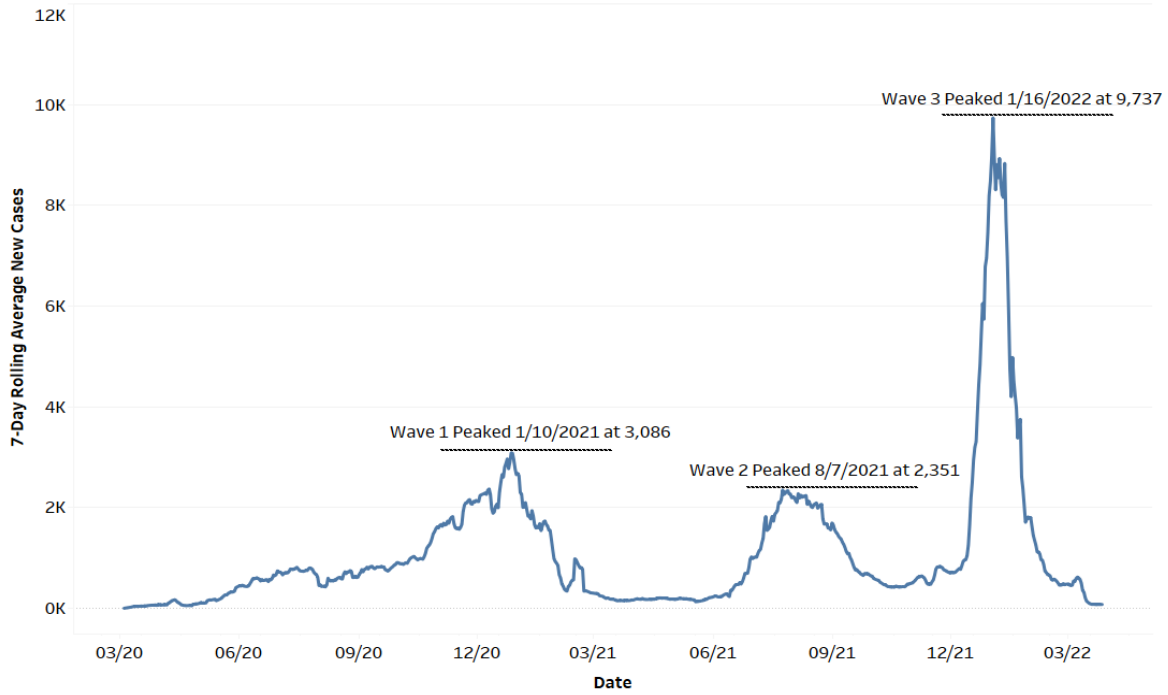
Quick Facts from the *Report* are:

- The 30-day models are forecasting 12,963 new cases by May 10. New daily cases are expected to average 432 per day.
- The 30-day model forecasts 997 new COVID hospitalizations by May 10, averaging 33 per day.
- The 30-day model is forecasting an average of 14 COVID-19 deaths per day for the next two weeks, adding 632 new deaths over the next 30 days, averaging 21 per day.

The models show the number of new cases, hospitalizations, and deaths due to COVID-19 in the next 30 days, compared to one month ago, will continue to be flat.

As shown in Figure 1, the COVID-19 pandemic in Arkansas has followed a wave pattern. Figure 1 shows the seven-day rolling average of new infections since March 2020. Daily

Figure 1. *COVID-19 waves in Arkansas*



numbers are often considered too "noisy" to accurately reflect an epidemic's growth. To reduce noise, we use rolling averages to smooth out meaningless daily differences in infections. The reason for the wave pattern is primarily related to the virus' infectiousness and the number of people within a population susceptible to infection at a given time. Both factors are now highly dynamic.

What is easily discernable from data plotted in Figure 1 is that Arkansas recently experienced a COVID-19 wave that far exceeded all previous COVID-19 activity in the state. Prior to 2022, the month with the highest monthly average of new cases per day was January 2021, which saw an average of 2,262. In January 2022, Arkansas experienced an average number of new daily cases equal to 6,783. The 7-day rolling average of new daily cases in Arkansas in February dropped to 1,544, and further dropped to 417 in late March. During the first 17 days of April 2022, the new daily cases rate has been 77.

The COVID-19 virus mutates often. Like any virus, most COVID mutations are not viable and pose no risks to humans. However, occasionally, a mutation will produce a new variant with the potential to infect more people or make people sicker. New mutations may not pose much of a risk unless they are able to supplant or replace the circulating dominant variant. The dominant variants in Arkansas have been the Alpha, Delta and Omicron variants. As illustrated in Figure 1, each variant caused a surge in COVID cases, hospitalizations and deaths. The latest surge, which produced the most cases, hospitalizations, and deaths so far in the pandemic, was due to the Omicron variant. Omicron at its peak infected more than twice as many Arkansans as the Alpha and Delta variants combined.

Immunity to COVID-19 wanes over time. It does not matter whether immunity is induced by vaccination or is naturally acquired. Immunity acquired through vaccination is more predictable

and certain. Natural immunity, acquired from having been infected with COVID, varies with the severity of the COVID disease. As immunity wanes, whether induced by vaccination or disease, a person becomes more susceptible to a new infection. A person can be repeatedly infected.

In the two years the pandemic has stricken Arkansas, COVID has taught us several valuable lessons, which – if applied – can be used to guide better public health practices. Here are six lessons:

- COVID-19 infections follow a wave pattern. Infections waxed and waned over time. If the wave pattern continue, there will be another surge.
- COVID-19 infection is not seasonal. Infection waves can occur at any time.
- Waves of infection occur because COVID-19 immunity, whether induced by the vaccine or natural, wanes. New waves tend to coincide with immunity waning in a population.
- The COVID-19 vaccine works. The vaccines can prevent infections. More importantly, they are very good at preventing serious disease, hospitalizations and deaths. But, immunity must be periodically boosted.
- It is far safer to gain immunity to COVID-19 from the vaccine than from an infection. There is no risk of serious illness, hospitalization or death from the vaccine.
- The public tends to pay attention to the pandemic when it is surging, as evidenced by the history of COVID testing and vaccine uptake in the state.

Arkansas is facing a new variant and waning population immunity. The new variant has been dubbed Omicron B.2 or the Deltacron variant. Some scientists are calling the variant Deltacron because it has genetic similarities to both the Delta and Omicron variants. Deltacron appears to be more infectious than Omicron. Deltacron infections in Germany, for example, are doubling every week. Hospitalizations are also increasing. In Germany, elderly patients make up much of the increase in hospitalizations because, while a large population of older people were vaccinated, their immunity has waned and they are susceptible to the new variant.

Arkansas is in a pandemic breathing space right now. But, we should expect another surge due to the Deltacron variant. Only about a third of Arkansans have received a booster vaccination. Most who were fully vaccinated completed the two doses early in 2021. These individuals likely have waning immunity. Furthermore, despite a large number of infections during the Omicron surge, natural immunity associated with those infections is also likely waning.

To respond to a new surge, Arkansas should reinvigorate vaccination efforts, particularly in nursing homes and medical facilities treating large numbers of geriatric patients. Public health messaging should be in place to give the public easily understandable information about COVID and the benefits of immunization, facemasks and other prevention measures. The public should also be told about the financial cost of COVID, including missed time from work, medical bills not covered by insurance, reduced retail sales due to self-isolation, and a lack of or delayed services due to reduced labor. Colleges and universities should be prepared to suspend classroom teaching in favor of distance learning. Daycare, elementary and high school programs should have plans in place to reimpose strict CDC recommended infection prevention measures and, if needed, close programs for short periods of time. Hospital systems should be prepared for another surge in COVID patients, many of whom, because they will be older, will be more complex and difficult COVID cases.

Everyone in Arkansas is hoping, and to some extent, acting like the pandemic is over. Unfortunately, it is not. Arkansans do not need to be at red alert all the time. But, we must be

prepared to go back on alert status when circumstances warrant. In the next two to three months, we may need to do so again. The state has had 11,000 COVID deaths in two years. Arkansans should resolve to not add another five to six thousand COVID-19 deaths in the coming year.

Figure 2a shows the COVID-19 testing rate per 1,000 persons in Arkansas. The testing rate has significantly declined in the last few months. As of April 7, the state performed 0.9 tests per 1,000 persons, which is lower than the national average of 1.9.

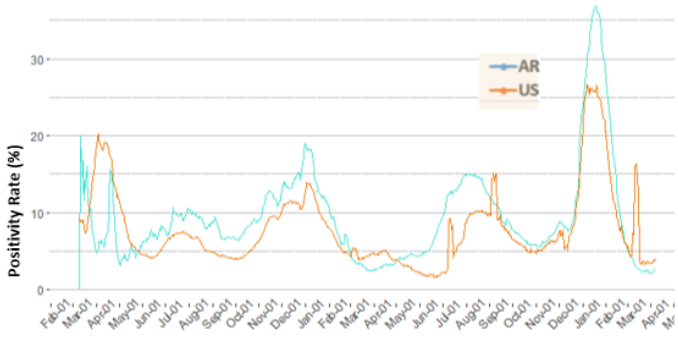
Testing is done to protect Arkansans from being exposed to new cases when they are highly infectious. It requires a comprehensive testing, reporting and case management system. Because of at home testing, people are not reporting positive tests to the Arkansas Department of Health (ADH) making it a challange to track the spread of COVID in Arkansas. Having low numbers in the state and nationally reflects the emergence of at home test kits.

Figure 2a. *COVID-19 testing rate per 1,000 through April 7*

The COVID-19 positivity rate is an indicator of viral transmission. The positivity rate is the number of people who test positive for COVID-19 as a proportion of the number of people tested. A higher positivity rate is indicative of higher transmission relative to the number of tests. A higher state positivity rate and a relatively low testing level raises serious concerns about our ability to know the "true" number of COVID-19 cases in the state.

Figure 2b shows the seven-day moving average of positivity rates in Arkansas and the United States. The positivity rates in Arkansas and the U.S. spiked during late January due to the high number of Omicron infections. But, in recent weeks, both state and national positivity rates have declined significantly. The state's positivity rate currently stands at 2.7%, which is lower than the national average of 3.9%. Since there is no active surveillance either statewide or nationally, both the per capita testing rate and the positivity rate estimates should be considered extremely conservative. While early in the pandemic the positivity rate was used in decision making, at this point we recommend against using it.

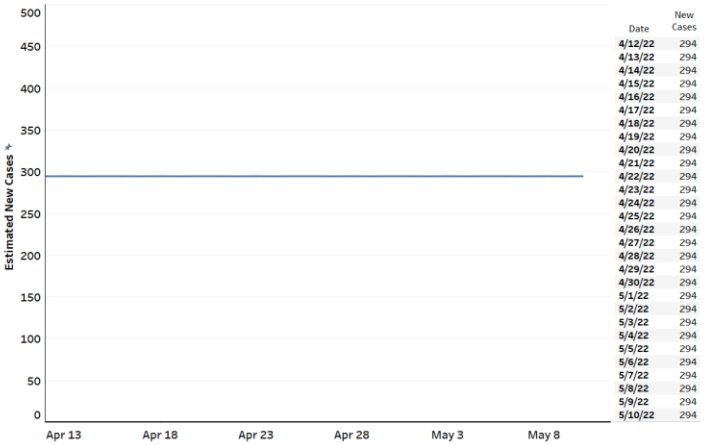
Figure 2b. *COVID-19 positivity rates through April 7*



COVID-19 Cases

PCR tests are the gold standard for identifying COVID-19 cases and probable cases are diagnosed using an antigen test. Antigen test results have been reported by ADH since September 2, 2020. ADH continues to distinguish between confirmed and probable cases, but they are combined for this report. In the report, confirmed and probable cases are "cases." For this report, we used data from February 1 to April 10 to ensure greater stability in the models. As home test kits have influenced case reporting to ADH, all forecasts are conservative and likely underestimates of the scope and magnitude of COVID-19 cases in Arkansas.

Figure 3a. *New Daily COVID-19 cases*



Date	New Cases
4/12/22	294
4/13/22	294
4/14/22	294
4/15/22	294
4/16/22	294
4/17/22	294
4/18/22	294
4/19/22	294
4/20/22	294
4/21/22	294
4/22/22	294
4/23/22	294
4/24/22	294
4/25/22	294
4/26/22	294
4/27/22	294
4/28/22	294
4/29/22	294
4/30/22	294
5/1/22	294
5/2/22	294
5/3/22	294
5/4/22	294
5/5/22	294
5/6/22	294
5/7/22	294
5/8/22	294
5/9/22	294
5/10/22	294

Forecasts of COVID-19 cases in Arkansas. New daily cases for the period April 12 to May 10 are shown in Figure 3a. The model is forecasting an average of 294 new cases per day for the next 30 days.

Figure 3b. *Cumulative COVID-19 cases through May 10*

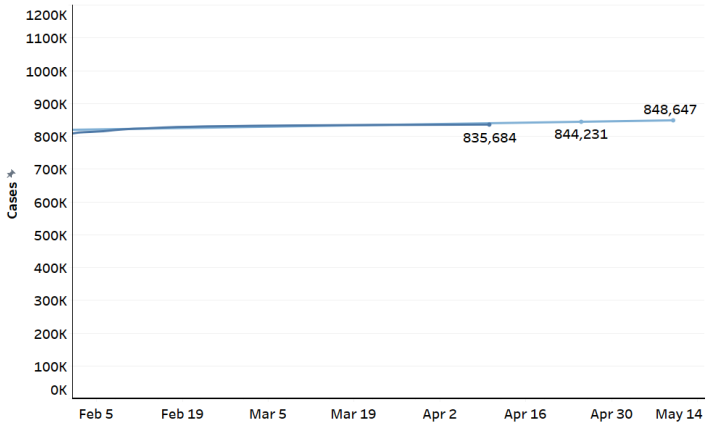
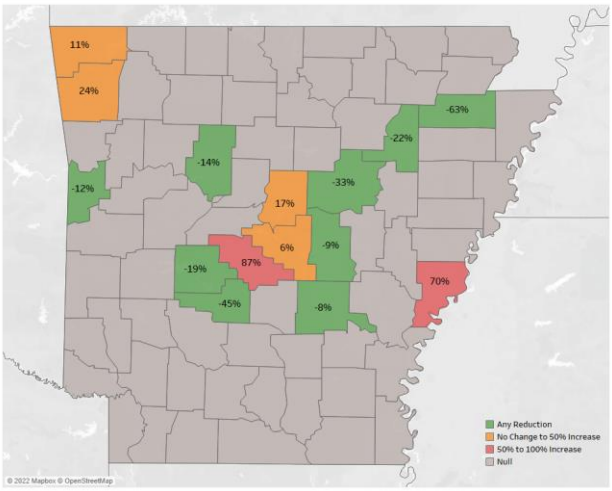


Figure 3b shows the forecast of cumulative COVID-19 cases through May 10. The 30-day cumulative forecast shows Arkansas will reach 848,647 cumulative cases by May 10, a potential increase of 12,963 cases.

Map 1. Relative change in *COVID-19 cases*

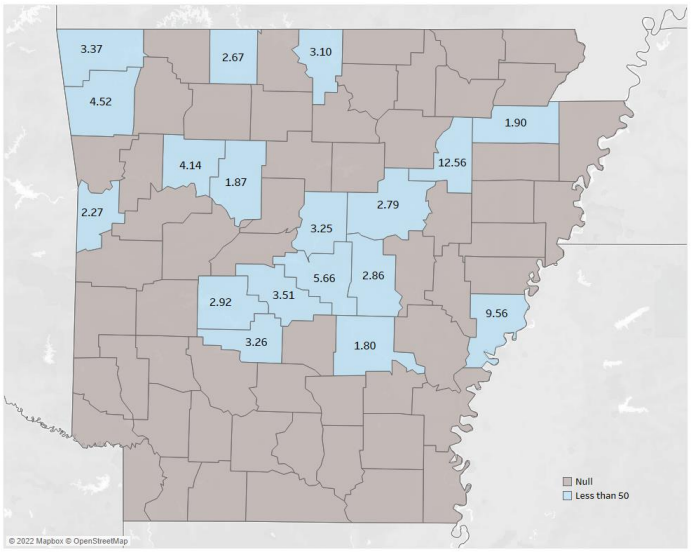


Relative change in COVID-19 cases by county. Map 1 shows the relative change in COVID-19 cases across Arkansas counties in the past two weeks. Relative change is calculated as the percent change between cases during the most recent two-week period (March 28 to April 10) compared to cases from the prior two weeks (March 14 to March 27).

The relative change in cases presents the most definitive pattern we have seen across the state in some time. Most counties report reduced relative change rates for the last two weeks. The largest relative increase in COVID-19 cases was in Saline County (87%) and the largest decline was in Craighead County (-63%). Counties with fewer than 10 cases during the most recent two weeks, or the prior two weeks, are displayed as "null" and shown in gray.

As shown on Map 2, 18 counties in Arkansas had elevated per capita COVID-19 cases between February 28 and March 13, but at low levels. Per capita case rates ranged from 0 to 14 cases per 10,000 persons. All counties had case rates below 50. Case rates are now similar to what they were in September 2020, before the Delta surge, when only two counties had per capita case rates greater than 30 per 10,000.

Map 2. *COVID-19 two-week per capita case rate*

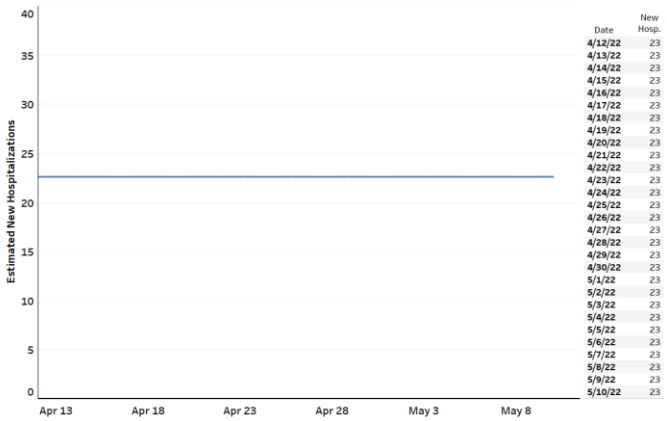


Summary. The 30-day models are forecasting a slight decline from previous numbers in new daily COVID-19 cases in Arkansas through April and into May.

There are currently no COVID "hotspots" in the state. COVID-19 cases are not localized to any region in Arkansas, with per capita cases declining in every county in the state.

COVID-19 Hospitalizations

Figure 4a. *New daily hospitalizations*



Date	New Hosp.
4/12/22	23
4/13/22	23
4/14/22	23
4/15/22	23
4/16/22	23
4/17/22	23
4/18/22	23
4/19/22	23
4/20/22	23
4/21/22	23
4/22/22	23
4/23/22	23
4/24/22	23
4/25/22	23
4/26/22	23
4/27/22	23
4/28/22	23
4/29/22	23
4/30/22	23
5/1/22	23
5/2/22	23
5/3/22	23
5/4/22	23
5/5/22	23
5/6/22	23
5/7/22	23
5/8/22	23
5/9/22	23
5/10/22	23

30-day forecasts of hospitalizations. Figure 4a shows the realized rate of new hospitalizations in Arkansas between April 12 and May 10. Hospitalizations have reached a point of apparent equilibrium. Average new hospitalizations per day are expected to be 23 through May 10.

The 30-day forecast for cumulative COVID-19 hospitalizations is shown in Figure 4b. The model forecasts a total of 38,491 cumulative hospitalizations by May 10, an increase of 997 patients in the next month.

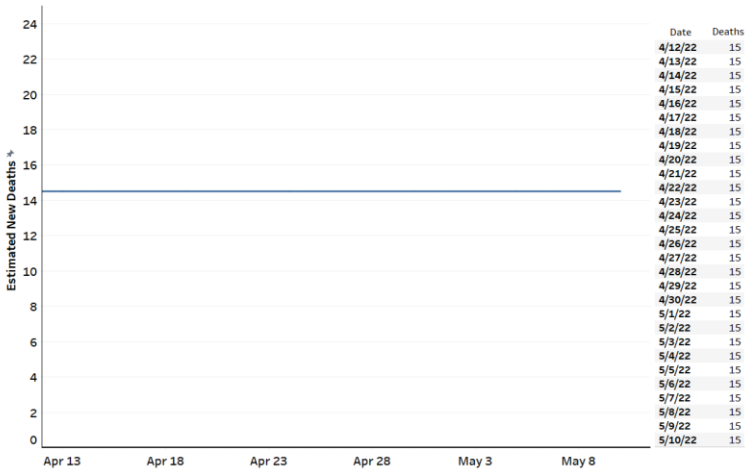
Summary. Hospitalizations will be level over the next month.

COVID-19 Deaths

30-day forecast of COVID-19 deaths. Figure 5a shows the realized rate of new COVID-19 deaths in Arkansas from April 12 to May 10. The model forecasts an average of 15 deaths per day through May 10.

Figure 5b shows the 30-day model forecast of 12,269 cumulative deaths in Arkansas due to COVID-19 by May 10. The model is forecasting 632 new COVID-19 deaths over the 30-day forecast.

Figure 5a. *Daily COVID-19 deaths*



Date	Deaths
4/12/22	15
4/13/22	15
4/14/22	15
4/15/22	15
4/16/22	15
4/17/22	15
4/18/22	15
4/19/22	15
4/20/22	15
4/21/22	15
4/22/22	15
4/23/22	15
4/24/22	15
4/25/22	15
4/26/22	15
4/27/22	15
4/28/22	15
4/29/22	15
4/30/22	15
5/1/22	15
5/2/22	15
5/3/22	15
5/4/22	15
5/5/22	15
5/6/22	15
5/7/22	15
5/8/22	15
5/9/22	15
5/10/22	15

Summary. The number of daily deaths from COVID-19 appears to be relatively stable at 15 deaths per day, a slight decrease from 18 deaths per day in last month's report. Deaths lag in both cases and hospitalizations, which suggests the number of deaths should continue to decrease if the trend in cases and hospitalizations continue to decrease.

Figure 5b. *Cumulative COVID-19 deaths through May 10*