



**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 Feb. 13.

Summary points are:

- The models are forecasting 32,979 new cases by March 15. New daily cases are expected to average 1,061 per day.
- The 30-day models continue to show Arkansans between ages 35 and 59 will have the highest number of COVID-19 diagnoses — forecast to increase by 10,477 cumulative cases by March 15.
- The models forecast 1,627 new COVID hospitalizations by March 15, averaging 51 per day.
- The 30-day model is forecasting an average of 14 COVID-19 deaths per day for the next two weeks, adding 445 new deaths over the next 30 days.

The models are showing a fairly rapid decline in the number of new cases and hospitalizations in the next 30 days compared to one month ago. There is a slower decline in deaths, likely because deaths lag cases and hospitalizations. Models are based on past data, and do not account for increases or decreases since the data were downloaded on Feb. 14.

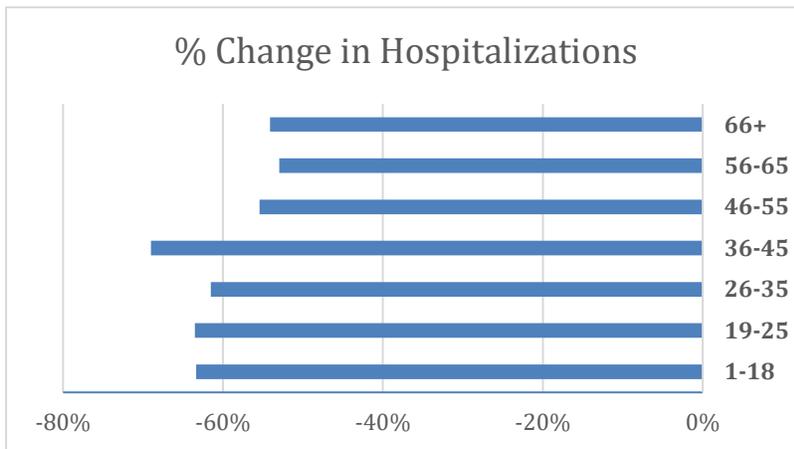
As shown in Figure 1, cases have decreased an average of 74% in all age groups in the last month compared to the previous month. The largest decrease in cases was in children aged 1 to 18. All other age groups decreased by at least 60%. Overall, Arkansas saw a decline in new daily cases from 10,875 to 2,663.

Hospitalizations also decreased over the last month by an average 60%.

Hospitalizations decreased in children aged 1 to 18 by 63% and by nearly 64% in adults 19 to 25, as shown in Figure 2. All other age groups decreased by 50% or more, as demonstrated by a decrease in the average new daily hospitalizations from 258 to 112.

Projecting the course of the pandemic in Arkansas, and most likely all other states, will be made more difficult with the widespread use of at-home COVID tests. Results of at-home tests

Figure 2. Percent change in hospitalizations from 1/17-1/30 to 1/31-2/13

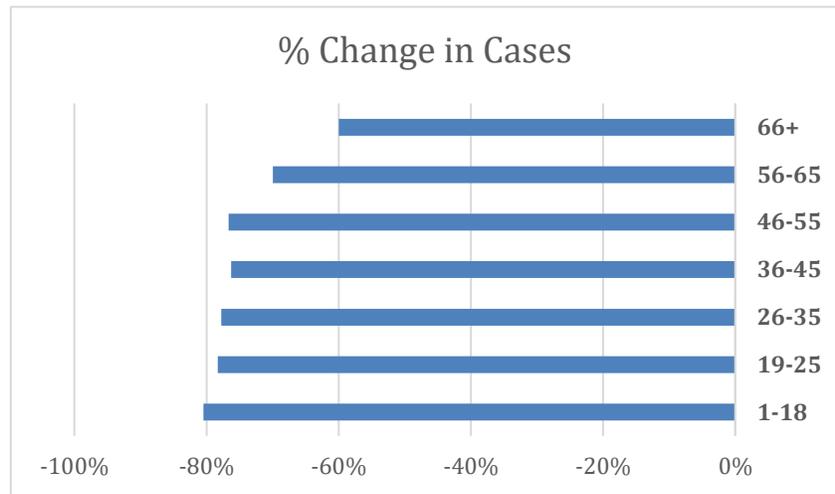


for the most part will be private, and, thus, not included in the number of cases reported to the Arkansas Department of Health (ADH). The result will be models using case counts to forecast trends will be less reliable and more likely significantly underestimate future cases. On the other hand, models of hospitalizations and deaths will remain reliable, as these data will not be impacted by case data.

As the recent COVID-19 surge is trending downwards, it is time to take stock of the impact of the disease on the state. COVID-19 has had a tremendous impact on Arkansas during the last two and one-half years. To date, there have been over 10,000 COVID deaths in Arkansas. Using measures for the value of a statistical life, which varies from \$4.6 million to \$9.3 million per person, the estimated economic loss to the state from COVID-19 deaths ranges from \$46 billion to \$93 billion. The lower estimate takes into consideration the age distribution of those who have died of COVID. The real impact of more than 10,000 COVID-19 deaths, however, is immeasurable.

A better sense of the impact of COVID-19 on the state might be achievable, if the effect of Omicron alone is considered. From Dec. 15 to Feb. 13, there were 252,025 confirmed COVID cases in the state. Of these, 62,000 were in children under 18. Since the majority of people with COVID were not tested, the number of persons infected in the last two months was far greater, perhaps as many as one million Arkansans. During the same two-month period, 5,426 Arkansans

Figure 1. Percent change in cases from 1/17-1/30 to 1/31-2/13



were hospitalized with COVID disease. Of these, 250 were children. The average cost of a non-complex COVID-19 hospitalization in Arkansas is estimated to be \$42,500. On the low side, the cost of treating hospitalized COVID patients during the Omicron surge to date is \$230,605,000. This estimate does not include the cost of treating complex hospitalizations, which is estimated at \$240,000 more per case. Of course, the cost of hospitalization is not completely covered by insurance. Patients will be billed for substantial amounts once released, estimated at upwards of \$4,000. In addition, there are other costs associated with the Omicron variant, including lost family income, transportation, lost opportunity costs, and emotional costs. Given the costs of the two months between Dec. and Feb. 13, it cannot be claimed the Omicron variant was a “mild” disease.

A major question with the Omicron variant is, at what point will its exponential growth curve bottom out? For surges associated with previous variants, the ebb or bottom of the exponential growth curve was 100 or fewer cases. The Omicron surge is still well above previous low points, with the seven-day moving average over 1,000 new cases. The low point of the current Omicron surge may not reach previous low points. This conclusion is supported by other data. First, immunity, whether produced by a vaccine or by infection, wanes over time. This suggests, with a booster vaccination rate in the state of 37%, about half of Arkansas are still susceptible to Omicron infection or re-infection. Second, Omicron is highly infectious; in other words, it is easy to get the disease. This suggests, the virus will continue to widely circulate in our communities much longer than for the Alpha or Delta surges. From these two points, we can expect the current surge to bottom at a much higher level than earlier surges.

There has been a lot of talk and editorialization lately about the “new normal;” that is, with the decline in new cases, the normalization of life with COVID. Many public health pundits and others are wondering whether COVID is becoming an endemic, rather than a pandemic disease. Endemic means COVID will begin to resemble other pulmonary infectious diseases, like pneumonia or the flu. Normalization, however, is dependent on at least two conditions. First, continual development of effective antiretroviral medications must keep pace with the disease. Second and most importantly, the level of the virus in the world population must be reduced to a point where future mutations are less likely. Neither of these conditions have been met.

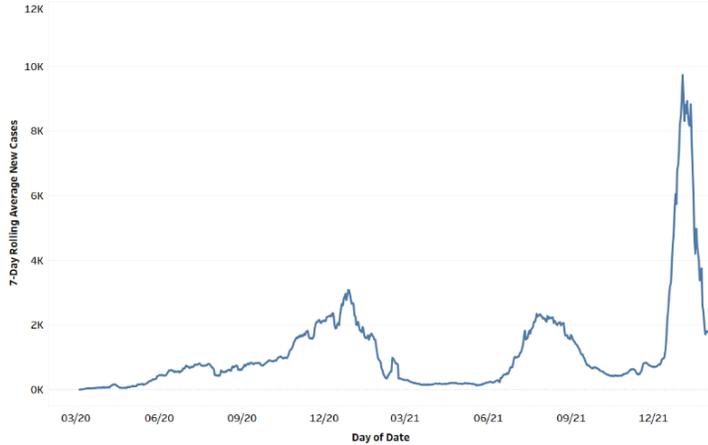
What should we expect in the future? Evidence suggests COVID-19 is following a wave pattern of infection; with repeated waves cresting and falling. The COVID-19 pandemic is not a “one and done.” Furthermore, there is some indication waves may be coming faster than at the beginning of the pandemic. The speed of the waves depends on the infectiousness of the variants produced, and Omicron was extremely infectious. Therefore, there was roughly four months between the Delta (summer) wave and the Omicron (second winter) wave, compared to 12 months between the Alpha and Delta waves. And, COVID-19 continues to mutate. A new variant is beginning to circulate in the state. B.2 or “stealth Omicron” is even more infectious than Omicron. Therefore, it is quite likely Arkansas has not seen the back of COVID, nor, with the chances of more mutations, is the virus likely to settle down and become endemic.

Arkansas needs to begin to plan now for future surges and for how we will “return to normal” with COVID-19 being a continuing presence.

The COVID-19 Pandemic in Arkansas

Figure 3 shows the seven-day rolling average of new infections since March 2020. Daily 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.

Figure 3. Seven-day rolling average of daily COVID-19 cases



What is easily discernable from data plotted in Figure 3 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 February to date has dropped to 2,317.

Figure 4a shows the COVID-19 testing rate per 1,000 persons in Arkansas. With the recent surge in cases at the end of December until the end of January, testing increased significantly. With the recent decline in cases, testing tapered off. As of Feb. 13, the state performed 2.2 tests per 1,000 persons, which is lower than the national average of 4.9. Without regular, widespread testing and reporting of cases to ADH, which is the best data for estimating the spread of disease in a population, forecasting future cases, hospitalizations, and deaths is more difficult.

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 relatively low testing level raises serious concerns about our ability to know the “true” number of COVID-19 cases in the state.

Figure 4a. COVID-19 testing rate per 1,000 through Feb. 13

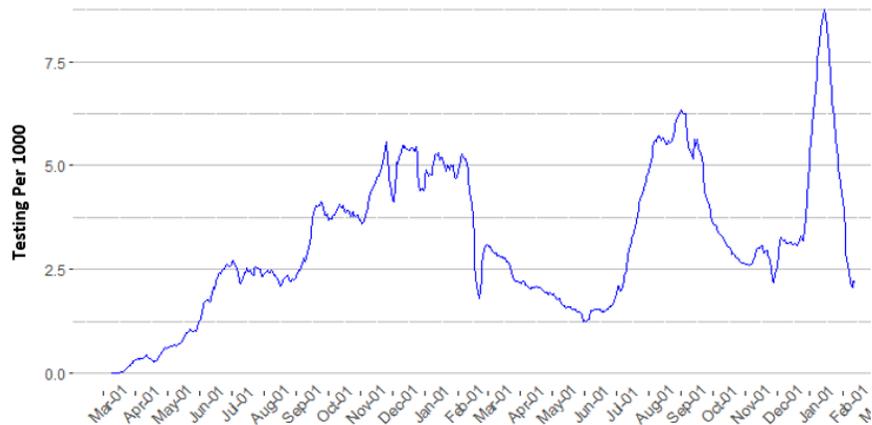


Figure 4b shows the seven-day moving average of COVID-19 positivity rates in Arkansas and the United States. The positivity rates in Arkansas and the U.S. spiked during the later part of January due to the runaway Omicron infection rate. But in recent weeks, both state and national positivity rates have significantly declined. The state's positivity rate currently stands at 14.6%, which is above the national average of 10.9%. However, it is markedly lower than the positivity at the time of the last report (32.5%). Because there is no active COVID-19 surveillance either statewide or nationally, both the per capita testing and positivity rates should be considered very conservative.

Figure 4b. COVID-19 positivity rates through Feb. 13



COVID-19 Cases

PCR tests are the gold standard for identifying COVID-19 cases and probable cases are diagnosed using an antigen test. Antigen tests results have been reported by the ADH since Sept. 2, 2020. ADH continues to distinguish between confirmed and probable cases, but they are combined for this report. Throughout the report, confirmed and probable cases are “cases.” For this report, we used data from Feb. 1 to ensure more stable models.

Forecasts of COVID-19 cases in Arkansas. New daily cases for the period Feb. 15 to Mar. 15 are shown in Figure 5a. The 30-day model is forecasting an average of 1,061 new cases per day for the next 30 days.

Figure 5a. New COVID-19 cases

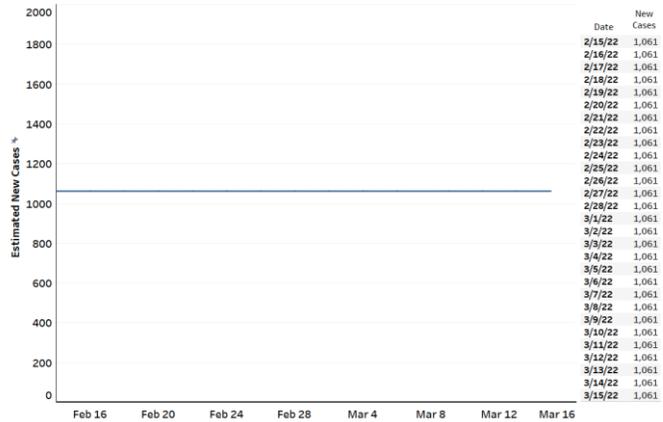
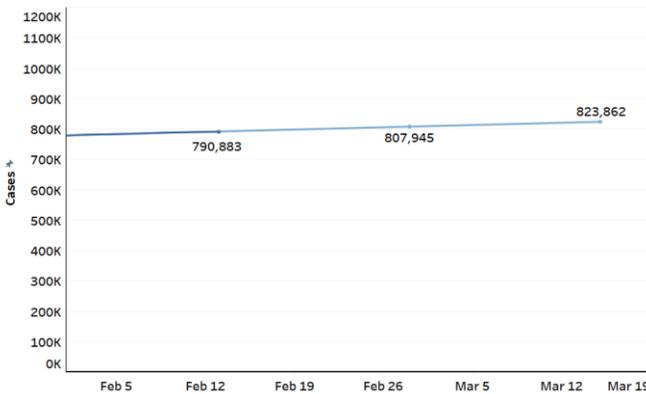


Figure 5b. Cumulative COVID-19 cases through Feb. 15

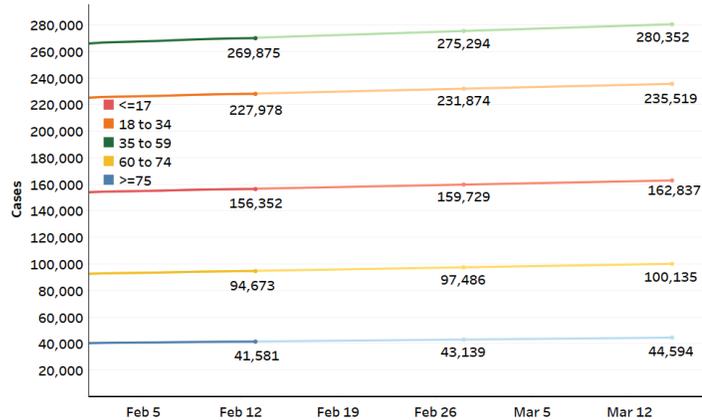


The 30-day model is forecasting an average of 1,061 new cases per day for the next 30 days.

Figure 5b shows the forecast of cumulative COVID-19 cases through March 15. The 30-day cumulative forecast shows Arkansas will reach 823,862 cumulative cases by March 15.

Forecasts by age. As shown in Figure 6a, the forecast of cumulative cases by age groups shows slight increases in every age group with small variations in growth patterns across groups. The lowest number of cases continues to be in Arkansasians 75 and older.

The age group with the greatest increase in cases continues to be Arkansasians 35 to 59. This age group will add about 10,477 new cases by March 15, averaging 349 new cases per day. The group with the second highest growth in cases will be young adults age 18 to 34. The model is showing an additional 7,541 will contract COVID by March 15. This is an average of 251 new cases per day.



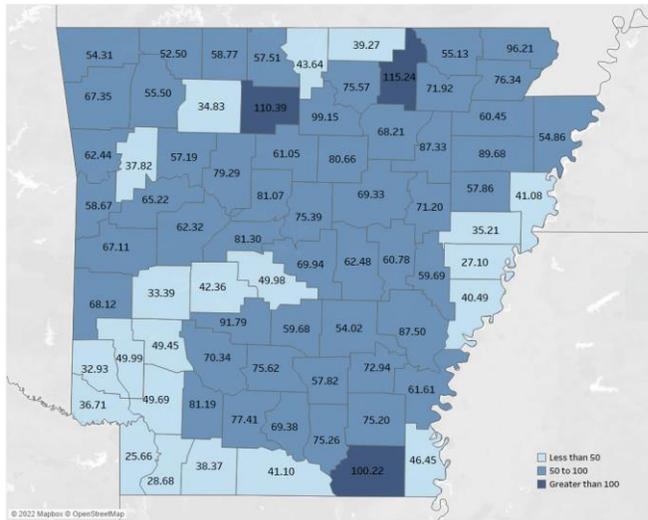
The model forecasts around 6,485 new COVID cases in children 17 and under through March 15, an average of 216 new cases per day.

Relative change in COVID-19 cases by county. Map 1 shows the relative change in COVID-19 cases across Arkansas counties in past two weeks. Relative change is calculated as the percent change between cases during the most recent two-week period (Jan. 31 to Feb. 13) compared to cases from the prior two weeks (Jan. 17 to Jan. 30).

The relative change in cases presents the most definitive pattern we have seen across the state in some time. All counties report reduced relative change rates for the last two weeks, compared to no counties with declines in the previous full report (Jan. 2022). The largest relative decrease in COVID-19 cases was in Sevier County (-89%) and the smallest decline was in Searcy County (-51%).

As shown on Map 2, all counties in Arkansas had elevated per capita COVID-19 cases

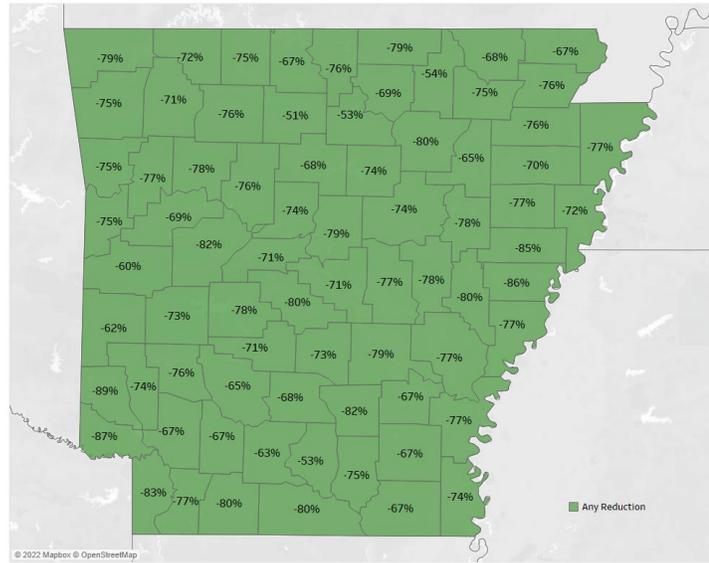
Map 2. COVID-19 two-week per capita case rate



COVID-19 cases will be in adults 35 and 59, as it has been through much of the pandemic. Young adults 18 to 34 will also experience high rates of new cases.

The surge in COVID-19 cases is not localized to any region in Arkansas. The per capita case rates remain high in every county in the state. The two-week per capita case rate is as high as 110 per 10,000 persons in three Arkansas counties.

Map 1. Relative change in COVID-19 cases



between Jan. 31 and Feb. 13. Per capita case rates ranged from 26 to 115 cases per 10,000 persons. Three counties had case rates above 100. Although fewer counties have over 100 compared to last month's report, numbers are still high compared to September, when only two counties had per capita case rates greater than 30 per 10,000.

Summary. The 30-day models are forecasting a decline in new daily COVID-19 cases in Arkansas through February and into March. Still, cases will be well above rates seen during the 2020-2021 winter and the 2021 summer surges.

The surge is having an impact on all age groups. The highest number of new

COVID-19 Hospitalizations

Figure 7a. New daily hospitalizations



30-day forecasts of hospitalizations.

Figure 7a shows the realized rate of new hospitalizations in Arkansas between Feb. 14 and March 15. As is easily discernible from the figure, hospitalizations have reached what might be a steady state. Average new hospitalizations per day are expected to be 51 through March 15.

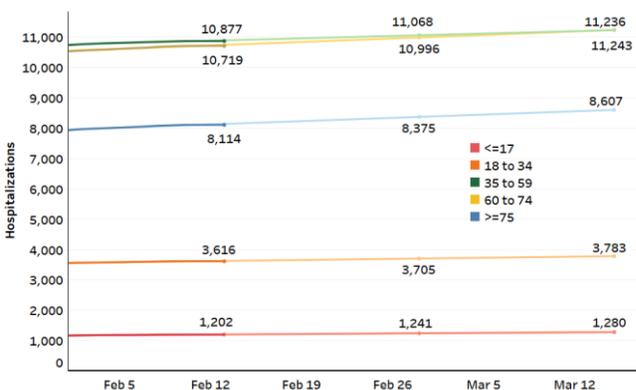
The 30-day forecast for cumulative COVID-19 hospitalizations is shown in Figure 7b. The model forecasts a total of 36,153 cumulative hospitalizations by March 15, an increase of 1,627 patients in the next month.

Figure 8 shows the 30-day forecast of hospitalizations by age group through March 15. As is evident, hospitalizations in all age groups will slightly increase. For the first time in the pandemic, adults aged 60 to 74 are forecasted to be the age group with the most hospitalizations, adding 524 new patients in the next 30 days. Adults 35 to 59 will have an estimated 359 newly hospitalized individuals over the next 30 days.

Figure 7b. Cumulative hospitalizations through Feb. 15



Figure 8. Cumulative hospitalizations by age group



Summary. Hospitalizations will be level over the next month. The models forecast the greatest number of hospitalizations due to COVID-19 will be adults 60 to 74, closely followed by adults 35 to 59.

COVID-19 Deaths

30-day forecast of COVID-19 deaths.

Figure 9a shows the realized rate of new COVID-19 deaths in Arkansas from Feb. 14 to March 15. The model forecasts an average of 14 deaths per day through March 15.

Figure 9b shows the 30-day model forecast 10,195 cumulative deaths in Arkansas due to COVID-19 by March 15. The model is forecasting 445 new COVID-19 deaths over the 30-day forecast.

Summary. The number of daily deaths from COVID-19 appears to be relatively stable at 14 deaths per day, an increase from 12 deaths per day in last month's report. Deaths lag both cases and hospitalizations, which suggests the number of deaths should begin to decrease if the trend in cases and hospitalizations continues to decrease.

Figure 9a. Daily COVID-19 deaths

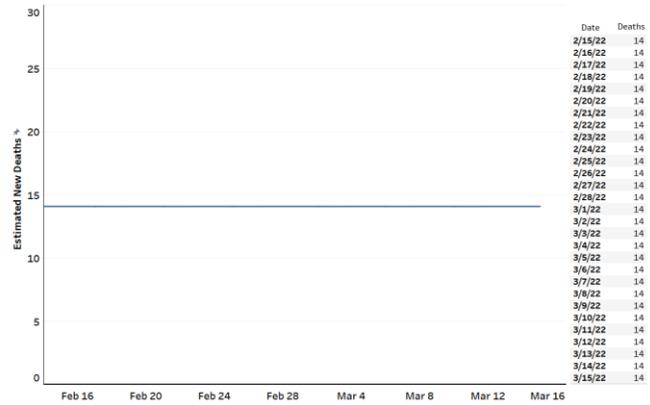
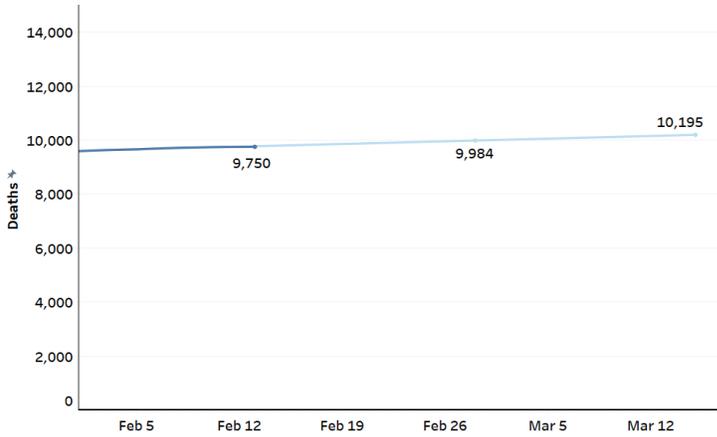


Figure 9b. Cumulative COVID-19 deaths through Feb. 15



Methodological Notes

Short-term forecasts. Time series forecasting is a method that uses observed data to predict future values. The purpose of the models is to fit the best curve to data and extend the curve into the future. To forecast aspects of the pandemic in Arkansas, the models used COVID-19 cases, hospitalizations, and death data reported to the Arkansas Department of Health. It should be noted the report defines a “case” as a COVID-19 test result reported and posted by the Department of Health. As indicated by recent research, the number of undiagnosed COVID-19 infections in the community may be higher by 40% to 50%.

Glossary of Terms

Active infection = a positive infection, with or without a COVID-19 test, that has not yet recovered or died

Case = a positive COVID-19 test result reported to the Arkansas Department of Health

Community = population not in a prison or population not in a prison or nursing home

Cumulative = total number of a given outcome (e.g., cases) up to date

Extended state-space SIR (eSIR) model = a model based on three components: susceptible (S), infected (I), and removed (R, including both recoveries and deaths)

Susceptible-Exposed-Infected-Recovered model (SEIR) = another variant of standard epidemiological model considering exposure as another factor controlling for disease dynamics

Hospitalization = a positive infection or case that was admitted to the hospital

Infection = a COVID-19 infection, with or without a test and regardless of having recovered or died

Positivity Rate = the number of people who test positive for covid-19 as a proportion of people have been tested

Projections = long-term predictions

Recovered = a positive infection that is no longer symptomatic or shedding virus

Susceptible = an individual who can be infected with the disease of interest

Time series forecast = short-term forecast of events through a sequence of time