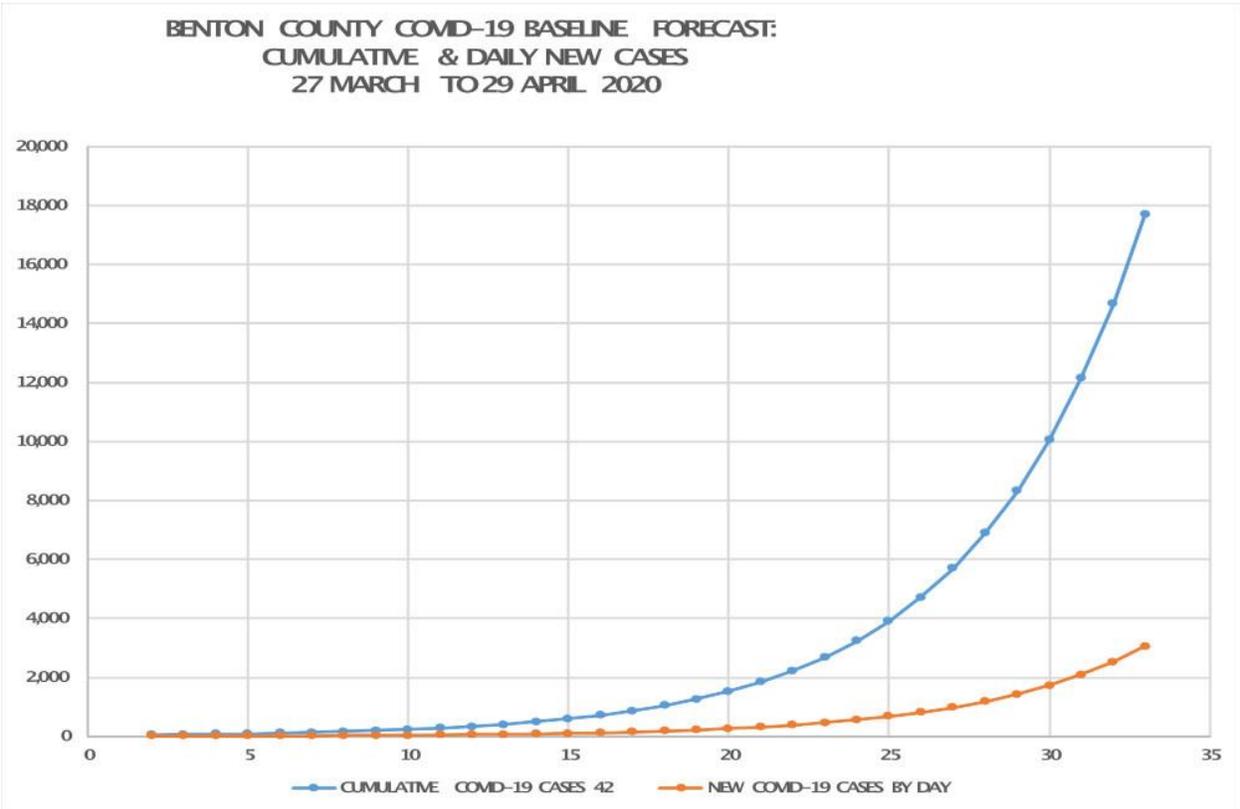


# Monitoring the COVID-19 Surge Peak in Benton County



By **David A. Swanson** • On Apr 07, 2020  
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*Introduction: The COVID-pandemic in Benton County appears to be playing out differently than in Whatcom County. Its surge peak is expected on April 29th, four days after the peak in Whatcom County. The baseline forecast for its peak is a total of 17,716 confirmed cases, which is 11,656 more than expected under the baseline for Whatcom County. Keep in mind that*

*Whatcom's population of approximately 225,000 is about **23,000 higher than Benton County's population**. Not surprisingly, Benton County's update is also higher at 10,052 confirmed cases – Whatcom's is 2,696. Because the now decommissioned Hanford nuclear site was constructed in Benton County during World War II, Benton County has inherited a more “high tech” economy than Whatcom: Only 5.9% of Whatcom County's workers are engaged in “Professional, Technical, and Scientific” occupations while 11.4 % of Benton County's workers are found in this category, making it second only to King County with 14.2%. However, it is not so dissimilar in other economic areas, including agriculture (4.6% in Benton v. 3.7% in Whatcom and educational services (Benton, 8.8% v. Whatcom, 11.4%). (More [here](#)) This leaves us with a question that is found when comparing many areas within and outside of Washington: What accounts for the difference in expected confirmed covid-19 cases?*

On April 1<sup>st</sup>, I constructed a baseline surge peak forecast of COVID-19 cases for Benton County, Washington. It is based on daily “confirmed” cases found at the COVID-19 website set up at Johns Hopkins University, which contains cumulative and new cases daily in a map, and past daily cases in an archive. The current cases are found [here](#). An example of the archived cases for March 29<sup>th</sup> is found [here](#). By changing the date, 03-29-2020, one can access different days. For example, if I wanted the archived case for April 1<sup>st</sup>, I would change the date and end up at [the archive that has the cases reported on April 1<sup>st</sup> by state and county](#).

With these data, I constructed a simple, extrapolative geometric model that is used to forecast confirmed cumulative and new COVID-19 cases by day to April 29<sup>th</sup>. The forecast shows an expected peak with 17,716 total confirmed cases expected by April 29<sup>th</sup> including 3,049 new cases that would be confirmed on April 29<sup>th</sup>. **Benton County's population is approximately 202,000** If the baseline forecast comes to pass, nearly nine percent of Benton County's population will be confirmed as infected by April 29<sup>th</sup>. The forecast goes out to April 29<sup>th</sup> because that is approximately when this initial surge will likely peak in Benton County.

The baseline forecast reflects social distancing and other conditions that were in place during the period, March 27<sup>th</sup> (42 confirmed cases) to April 1<sup>st</sup> (108 confirmed cases). I discuss these measures later.

The graph found at the top of this report shows the baseline forecast, which includes both the cumulative and daily number of new cases.

The model used to create the baseline forecast is based on the calculated rate of change found using the number of cases reported on March 27<sup>th</sup> (42) and April 1<sup>st</sup> (108), which is 1.20791088, where  $1.20791088 = (108/42)^{(1/5)}$ . The forecast is done by multiplying the most recent reported number of cases (108 on April 1<sup>st</sup>) by the rate of change (1.2079) taken to the power of the number of days since the most reported cases. For example, the forecast for April 6<sup>th</sup> is  $278 = 108 * [(1.2079)^{(5)}]$  and the forecast for April 29<sup>th</sup> is  $17,716 = 108 * [(1.20791088)^{(27)}]$ . The daily number of cases is found by calculating the difference between the forecasted total cases each day. For example, the daily number of cases expected on April 29<sup>th</sup> is 3,049, which is found by subtracting the forecasted total on April 28<sup>th</sup> (14,667) from the forecasted total on April 29<sup>th</sup> (17,716).

Unless the containment measures put into effect on March 24<sup>th</sup> by Governor Inslee and others are able to substantially reduce the expected number of COVID-19 cases, the forecast suggests that Benton County's health care facilities will be in turbulent waters by April 29<sup>th</sup> because there will

be 640 confirmed COVID-19 needing hospitalization in a county with 381 beds. With only 381-staffed beds, likely already full to overflowing, where would the 640 cases needing beds go? Three Rivers Convention Center? Lampson Field?

This preceding estimate is based on three factors applied to the forecast (1) the [American Hospital Directory](#) shows 381 staffed hospital beds in Benton County; (2) [evidence from Minnesota](#) suggests that 21 percent of confirmed cases will be hospitalized; and (3) Minnesota's hospitalization rate is applicable to Washington state from the perspective of an important demographic indicator of COVID-19 hospitalizations, age structure. As of 2018, [Minnesota's median age was 37.4 years and Washington's is 37.7.](#)

While the baseline somewhat reflects social distancing and other containment conditions that were proclaimed by Governor Inslee on March 24<sup>th</sup>, they had not been in place long. As such, the baseline largely represents what could be expected by April 29<sup>th</sup> in their absence.

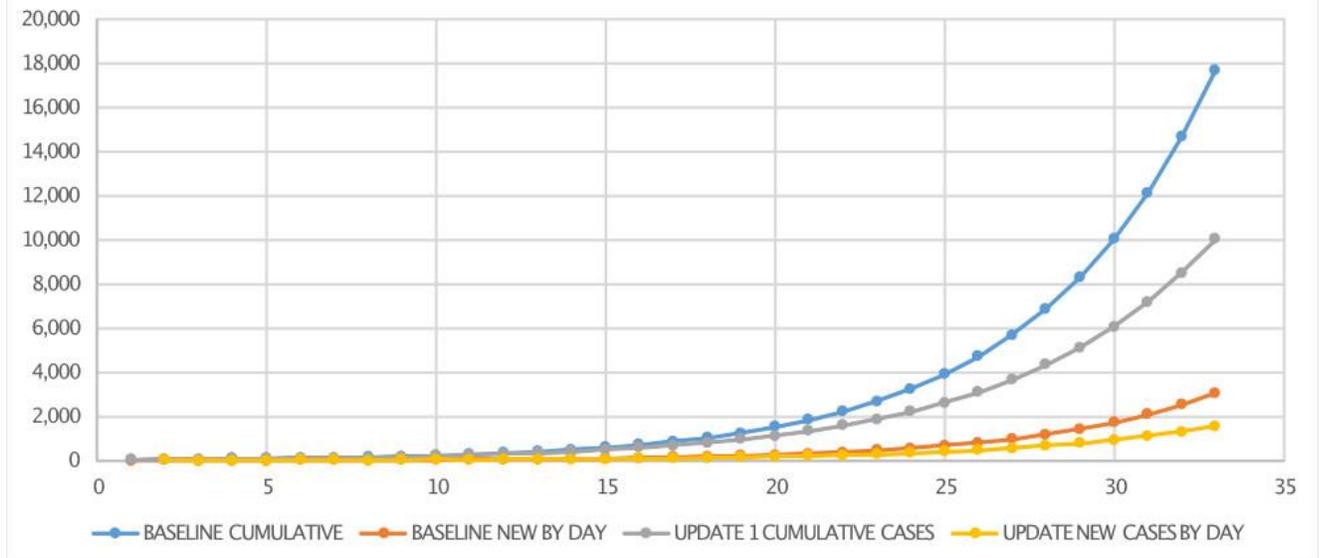
Now that several days have gone by, I believe an update at this point will provide us with some idea of the impact of "Stay at Home" and other containment measures proclaimed by the governor on March 25<sup>th</sup> (Combined of course, with how well these measures have been observed in Benton County). While we cannot completely attribute changes to these measures (changes in testing rates and the accuracy of testing will also affect the trajectory of the surge, for example), it is likely that this update provides an idea of how they are impacting the future course of the COVID-19 surge in Benton County.

With these caveats in mind, here is a comparison between the baseline and this update.

<b><u>As of 29 April (surge peak)</u></b>	<b><u>Baseline</u></b>	<b><u>Update</u></b>
Cumulative number of cases	17,716	10,052
Number of new case on April 29	3,049	1,554
Daily rate of change	1.2079	1.1828

A graph that compares the baseline with the updated scenario is immediately below.

## ROLLING SCENARIO V BASELINE COVID-19 FORECAST, BENTON COUNTY: CUMULATIVE & DAILY NEW CASES



**Click to enlarge the graph.**

As you can see, a decrease in the initial rate of change while still early in the surge, makes a substantial difference in the forecasted surge peak. In this case, a 2.08 percent decline in the daily rate of change in confirmed cases, less than a week from the initial baseline forecast, yields a 43 percent reduction in the cumulative number of cases by April 29<sup>th</sup>. Further, it reduces the number of new cases confirmed on that day by 49 percent. These results drive home the importance of slowing the spread of the virus in the early stages of the surge.

While the update scenario results are encouraging, it is clear that unless the rate of change in confirmed cases is reduced even more, Benton County's healthcare system will still be in turbulent waters indeed, in large part because demand will still exceed available staffed beds.

The update scenario also suggests we can expect nearly five percent of the population of Benton County to be identified as COVID-19 positive by April 29<sup>th</sup>. Of these 10,952 folks, we are still not sure how many will suffer the worst forms of the disease or end up dying. If the containment measures lose their efficacy, (lax observance?) we can expect a worsening of an already grim situation. I will develop another update in several days so we can monitor how Benton County is doing.