

# RESEARCH BRIEF

## COVID-19 RESEARCH BRIEF 2: WHEN COUNTY HOSPITAL BED DEMAND WILL FIRST SURPASS CAPACITY

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On March 16, 2020, Senator Walter Rand Institute for Public Affairs and the Center for Computational and Integrative Biology at Rutgers University-Camden in collaboration with New Jersey Health Initiatives released a research brief comparing estimates of available hospital beds, by the eight South Jersey counties, with the likely demand for hospital beds under three coronavirus spread scenarios. We estimated: 1) the number of hospital beds available per county, 2) peak hospital bed demand, and 3) when each county would reach peak demand.

This follow-up brief updates the previous model and predicts when demand for hospital beds will first surpass capacity in each of the 21 New Jersey counties. Two features of this model are new. First, the model combines a prior time period of no coronavirus action with a current time period of social distancing action. This combination is because Gov. Murphy imposed social distancing orders after we had positive cases in New Jersey. The new model accounts for those changes. Second, on March 23, the number of cases in each county varied substantially, with Bergen County having 609 cases and Cumberland and Salem Counties having only 1 case. In this model, we treated the counties individually. We determined how long it would take each county to reach hospital capacity by using the number of positive coronavirus tests in that county on March 23, the current number of hospital beds in that county, and the population in that county.

The updated analysis tells us several important things. **First, we need more coronavirus testing.** To know if we are doing enough to **flatten the curve**, we need to know where we currently **are** on the curve. To know where we are on the curve, we need to know how many people have the virus. Testing is the only way to get that information. Since we don't have widespread testing yet, we don't know if the 609 positive tests in Bergen county represent 10 percent of symptomatic infections or 80 percent of symptomatic infections. The range of dates presented in this brief shows this uncertainty in confirmed infections. The nearer date assumes we are testing 10 percent of symptomatic individuals, and the later date assumes we are testing 80 percent of symptomatic individuals.

**Second, these models provide valuable information about where in New Jersey we are likely to reach hospital capacity soonest, and when that will happen.** This is useful information even with the range of uncertainty we have due to testing limitations.

*Key findings include:*

1. Generally, stronger social distancing measures do not just delay the date when the **first** county reaches capacity

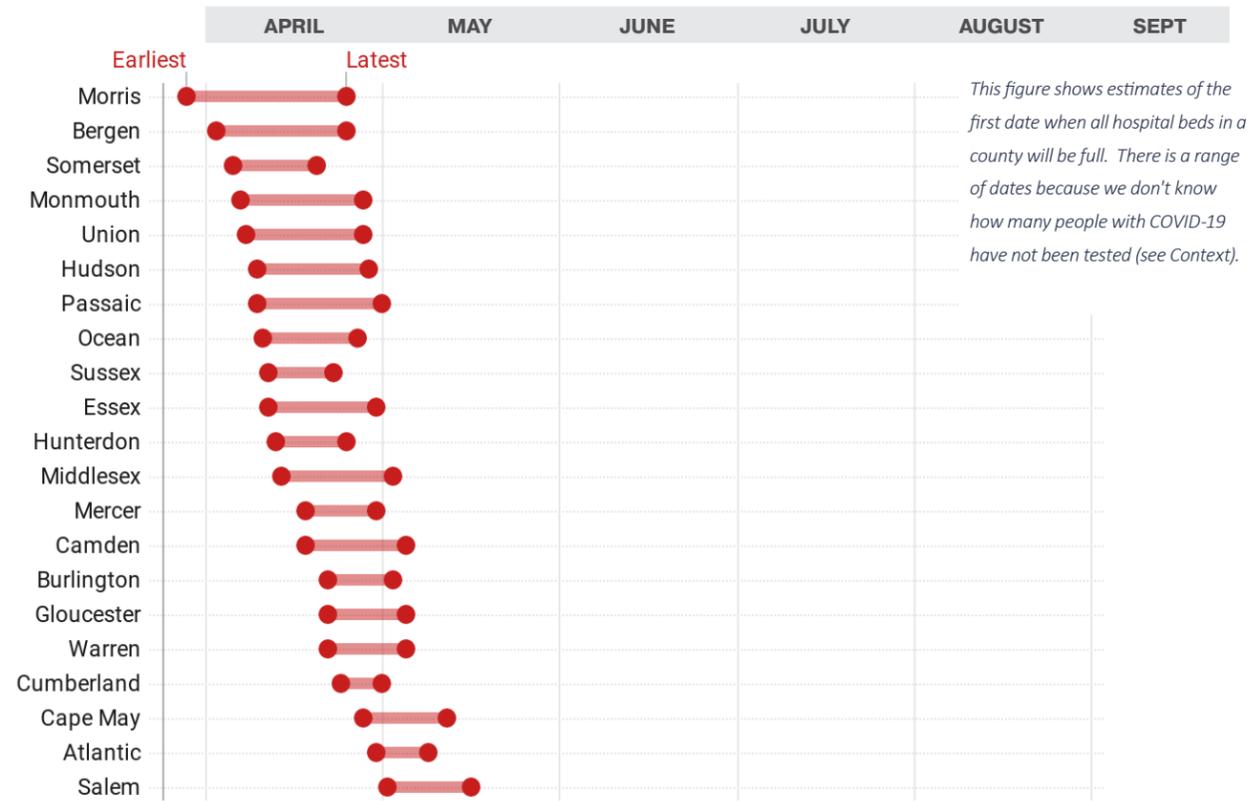
(**capacity date**), they also spread that capacity date out over summer 2020. This additional time to capacity could allow the state to mobilize health care resources (such as mobile beds, nursing staff, and ventilators) from county to county. This mobilization strategy has been advocated on a [global level as well as a local level](#). Under moderate social distancing, the capacity dates across all counties occur within a one month span (April 2020). Under stronger measures, counties are likely to reach their capacity dates over a three-month time frame (May-July 2020).

2. Counties in South Jersey are likely to reach hospital capacity **later** in the year than North Jersey. The exceptions to this are Cumberland and Ocean Counties in the South, and Warren County in the North.
3. The overall population of a county does **not** predict the capacity date. For example, Somerset County has roughly one-third of the population of Bergen County, but the model predicts they will reach capacity at about the same time.
4. Because of the nature of the coronavirus, there is a delay between when social behaviors change and when we observe changes in new symptomatic infections.

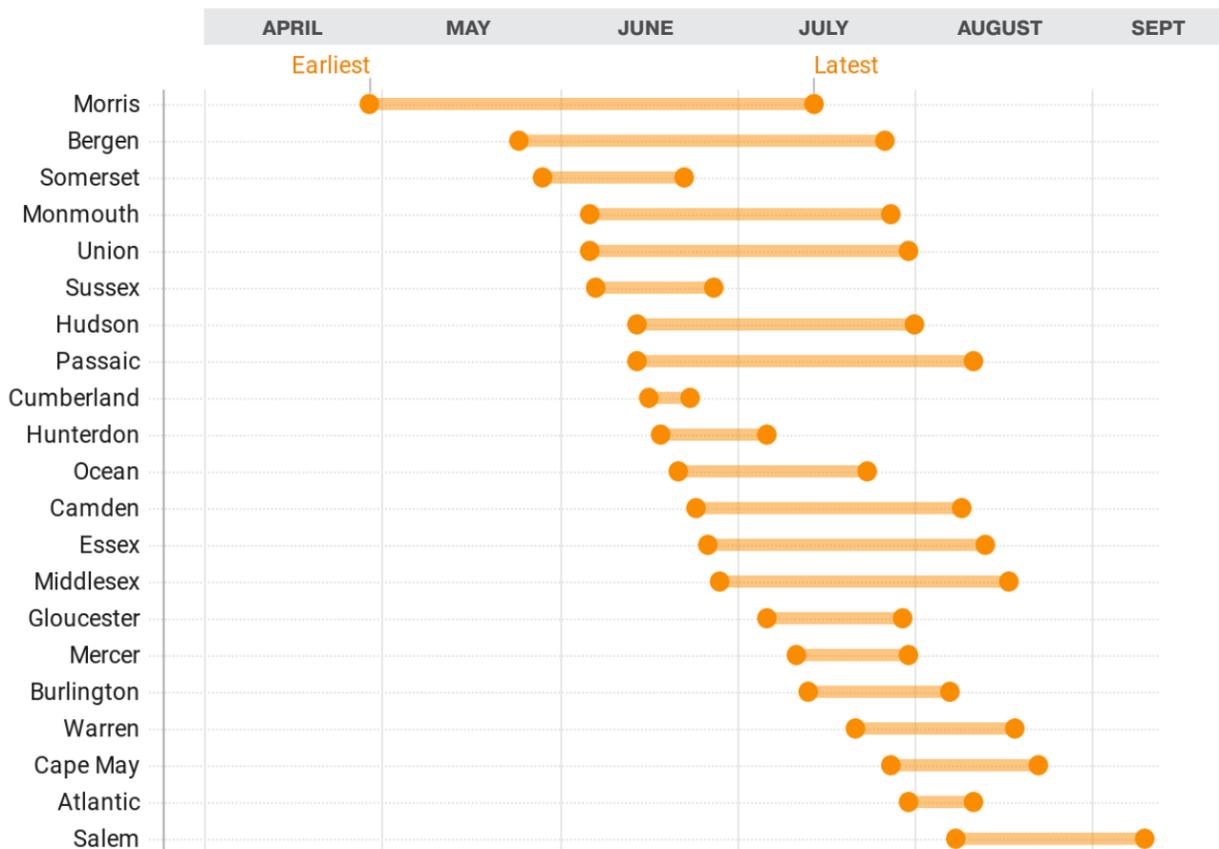
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**MODERATE**



**STRONG**



**CONTEXT**

Several factors produce uncertainty in the models. The unknown rates of testing, described above, create the first source of uncertainty—the range of dates for each county. It is also probable that the rate of testing varies by county. For example, counties with drive-through testing are likely to have higher testing rates than those without drive through testing.

The second source of uncertainty is which social behaviors constitute “strong” or “moderate” social distancing. “Social distancing” describes infection control actions taken by public health offices and others to stop or slow the spread of a contagious disease. This uncertainty is the difference between the moderate and strong graphics displayed on page two. Unfortunately, there is not yet enough data to answer that question. As more time passes and we understand the impact of social behaviors in other regions

of the world, we will update the model further. We do know that extreme social distancing measures (as implemented in China and South Korea) can flatten the curve completely, so that hospitals never reach capacity. However, we also know that even stay-at-home orders do *not* completely flatten the curve (as demonstrated in Italy prior to March 25). The scenarios here should be thought of as two possible outcomes, rather than predictions for a specific set of social behaviors.

The third source of uncertainty comes from what percentage of symptomatic people will need hospitalization, and for how long they will need to be hospitalized. There are a range of reports on these values. We used middle of the road estimates, as reported in our technical documentation.

COUNTY	POPULATION	PEAK SHORTFALL*	PEAK SHORTFALL*
		MODERATE	STRONG
Atlantic	265,429	5,668	1,761
Bergen	936,692	19,966	6,179
Burlington	445,384	9,464	2,908
Camden	507,078	11,253	3,789
Cape May	92,560	1,925	563
Cumberland	150,972	3,378	1,156
Essex	799,767	16,575	4,803
Gloucester	291,408	6,294	2,004
Hudson	676,061	14,400	4,449
Hunterdon	124,714	2,757	921
Mercer	369,811	7,914	2,470
Middlesex	829,685	17,038	4,826
Monmouth	621,354	13,418	4,272
Morris	494,228	11,044	3,770
Ocean	601,651	12,979	4,123
Passaic	503,310	10,456	3,048
Salem	62,607	1,230	309
Somerset	331,164	7,372	2,497
Sussex	140,799	3,146	1,073
Union	558,067	11,871	3,656
Warren	105,779	2,174	617
<b>TOTAL</b>	<b>8,908,520</b>	<b>190,321</b>	<b>59,194</b>

*\* Peak bed shortfall is the # of people who cannot get a needed hospital bed at the peak of outbreak. Peak shortfalls are current estimates and evolve as the world gets more data and our models improve.*

Senator Walter Rand Institute for Public Affairs (WRI) is an applied research and public service center at Rutgers University-Camden working to address issues impacting residents and communities in southern New Jersey. With two decades of experience in evaluation, public policy, and organizational development, WRI has helped organizations in the public, private, and nonprofit sectors develop partnerships and achieve optimal effectiveness. WRI aims to contribute knowledge for sound policy and practice in South Jersey through research, community engagement, and coalition building.

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