

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 2/22/21**

Leveraging over 15 years of support to HHS for medical consequence modeling and our proprietary artificial intelligence (AI) models, IEM believes that our Coronavirus model outputs can be used to assist localities and their medical facilities to better prepare for an increase in hospitalizations, to better plan for and locate drive-through testing facilities, and to determine where increased levels of transmission may be occurring.

**We have been refining our AI model over the past month and are confident in its ability to provide accurate 7-day projections that can be used for operational and logistical planning.**

**AI-based Model Background**

IEM is currently using an AI model to fit data from various sources and project new cases of COVID-19. We do not assume the average number of secondary infections (R-value) stays the same over time. IEM's AI model finds the best R-value over time to evaluate how it changes over the course of the outbreak. The IEM modeling team is running ~11 million simulations to fit each state's data and using the best fit for the R-value to project new cases over the next 7 days. The AI models are executed on a daily basis to evaluate the changing dynamics of the COVID-19 pandemic. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

The projections shown in this document are based on data pulled in as of 2/22/21 9 a.m.

**Please provide any feedback or send any questions that you might have to us. We are continually updating and improving the model, so your feedback is critical.**

**Also, if you have more current or refined data for your State, Commonwealth or Territory that you would like IEM to factor in, please let us know.**

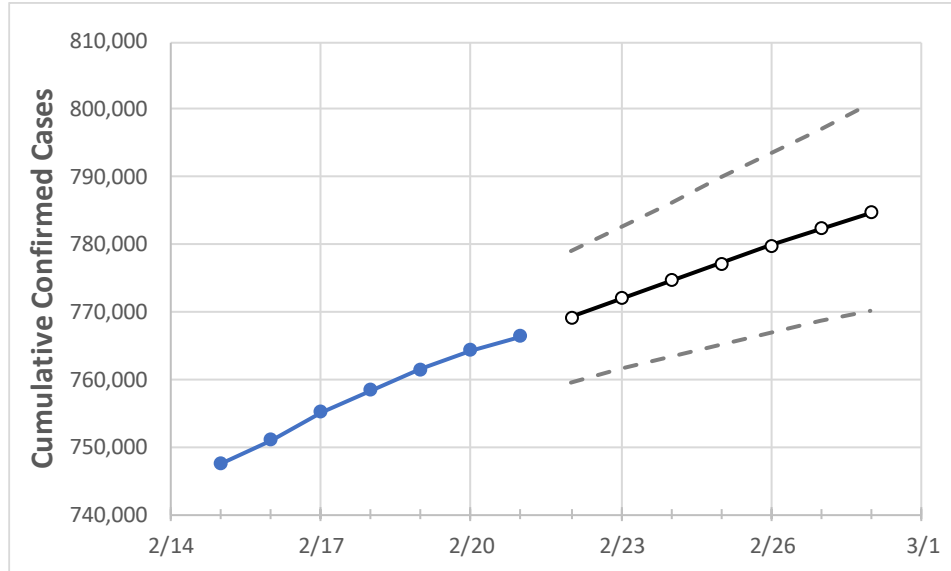
**IEM's Modeling Lead**

Dr. Prasith "Sid" Baccam is a **Computational Epidemiologist expert** at IEM with more than **20 years of experience in medical consequence modeling and simulation of disease outbreaks** and medical consequences following hypothetical attacks with biological agents or emerging infectious diseases. He develops key simulation models and decision support tools at IEM, specializing in public health, disaster response, and medical countermeasures (MCM) to enhance data-driven decision making and improve modeling assumptions.

Upon receiving his **Ph.D. in Applied Mathematics and Immunobiology** at Iowa State University, Dr. Baccam worked as a Postdoctoral Research Associate at Los Alamos National Laboratory where he focused on researching viral and immunological modeling. After his stint at Los Alamos, Dr. Baccam has served as Task Lead in multiple public health projects have allowed him to develop expertise as a mathematical biologist and a leader on high-performance modeling and simulation teams.

He has worked with state and local public health officials as well as Federal agencies, including **HHS**, the Centers for Disease Control and Prevention (**CDC**), and the Department of Homeland Security (**DHS**). Dr. Baccam has published numerous papers on public health response models and implications on policy and has been invited to participate in workshops and symposiums held by the Institute of Medicine (now the National Academy of Health). His modeling results have been briefed to the **Executive Office of the President** and informed two presidential policy actions.

## New Jersey State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	2/18	2/19	2/20	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28
New Jersey	758,451	761,498	764,375	766,405	769,263	771,946	774,588	777,233	779,790	782,289	784,755

Note: The State's projection shows a "best estimate" curve (the solid line with circles) and the dotted lines are the upper and lower estimates around that best estimate. Our projections have typically been within 10%, and are often within 5%, of actual confirmed cases.

## New Jersey Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	2/18	2/19	2/20	2/21	2/22	2/23	2/24	2/25	2/26	2/27	2/28
Bergen	73,819	74,126	74,471	74,689	74,998	75,302	75,599	75,897	76,194	76,488	76,767
Burlington	34,132	34,230	34,473	34,557	34,657	34,753	34,847	34,938	35,029	35,117	35,204
Camden	42,934	43,042	43,169	43,242	43,345	43,446	43,541	43,634	43,723	43,811	43,896
Essex	70,899	71,178	71,449	71,592	71,854	72,109	72,360	72,611	72,858	73,107	73,352
Gloucester	23,441	23,511	23,602	23,644	23,701	23,755	23,808	23,859	23,909	23,956	24,002
Hudson	66,417	66,716	66,897	67,058	67,303	67,533	67,765	67,998	68,219	68,448	68,676
Hunterdon	6,590	6,615	6,658	6,673	6,705	6,737	6,768	6,799	6,830	6,858	6,888
Mercer	26,919	27,015	27,098	27,143	27,223	27,303	27,380	27,455	27,524	27,593	27,662
Middlesex	69,979	70,279	70,503	70,672	70,923	71,162	71,406	71,644	71,863	72,090	72,302
Monmouth	54,178	54,467	54,680	54,840	55,077	55,309	55,534	55,755	55,973	56,188	56,393
Morris	35,898	36,077	36,220	36,328	36,471	36,611	36,749	36,886	37,017	37,141	37,268
Ocean	55,997	56,273	56,459	56,631	56,871	57,113	57,344	57,571	57,792	58,016	58,236
Passaic	55,180	55,408	55,529	55,633	55,806	55,979	56,159	56,320	56,481	56,646	56,804
Somerset	21,848	21,937	22,034	22,090	22,174	22,259	22,341	22,422	22,502	22,581	22,662
Sussex	8,701	8,750	8,797	8,805	8,841	8,877	8,911	8,944	8,977	9,009	9,041
Union	54,787	55,029	55,207	55,304	55,480	55,657	55,832	56,001	56,173	56,343	56,504
Warren	6,713	6,736	6,768	6,792	6,814	6,837	6,858	6,880	6,900	6,920	6,939

Some recipients of our daily COVID-19 short-term (7 day) projections have requested projections of demand for: hospital bed, intensive care unit (ICU) beds, and mechanical ventilation. We realize that different states and localities will have different characteristics for hospital demand of COVID-19 cases, and we are presenting the best assumptions we could find for those medical demands based on scientific literature and health data reporting. Specifically:

- **Beds:** For hospitalization, we use a range of 10% and 20% of cases require hospitalization based on CDC's report ([MMWR, March 18, 2020](#)) and state reports of COVID-19 cases.
- **ICU:** The CDC report found that 24% of hospitalized cases require ICU care.
- **Ventilators:** Based on clinical data from China and state reports, we assume that 50% of ICU cases require a ventilator.

If you have other estimates for these assumptions, please share them with us as we work to refine our modeling, assumptions, and data on a daily basis.

The medical demands shown in the table assume 20% of **cumulative** confirmed cases require hospitalization. To get the medical demand for the assumption that 10% of confirmed cases require hospitalization, simply divide the demand by 2.

### New Jersey Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	2/18	2/19	2/20	2/21	2/23			2/25			2/27					
Bergen	73,819	74,126	74,471	74,689	75,302	(15,060)	[3,614]	{1,807}	75,897	(15,179)	[3,643]	{1,822}	76,488	(15,298)	[3,671]	{1,836}
Burlington	34,132	34,230	34,473	34,557	34,753	(6,951)	[1,668]	{834}	34,938	(6,988)	[1,677]	{839}	35,117	(7,023)	[1,686]	{843}
Camden	42,934	43,042	43,169	43,242	43,446	(8,689)	[2,085]	{1,043}	43,634	(8,727)	[2,094]	{1,047}	43,811	(8,762)	[2,103]	{1,051}
Essex	70,899	71,178	71,449	71,592	72,109	(14,422)	[3,461]	{1,731}	72,611	(14,522)	[3,485]	{1,743}	73,107	(14,621)	[3,509]	{1,755}
Gloucester	23,441	23,511	23,602	23,644	23,755	(4,751)	[1,140]	{570}	23,859	(4,772)	[1,145]	{573}	23,956	(4,791)	[1,150]	{575}
Hudson	66,417	66,716	66,897	67,058	67,533	(13,507)	[3,242]	{1,621}	67,998	(13,600)	[3,264]	{1,632}	68,448	(13,690)	[3,286]	{1,643}
Hunterdon	6,590	6,615	6,658	6,673	6,737	(1,347)	[323]	{162}	6,799	(1,360)	[326]	{163}	6,858	(1,372)	[329]	{165}
Mercer	26,919	27,015	27,098	27,143	27,303	(5,461)	[1,311]	{655}	27,455	(5,491)	[1,318]	{659}	27,593	(5,519)	[1,324]	{662}
Middlesex	69,979	70,279	70,503	70,672	71,162	(14,232)	[3,416]	{1,708}	71,644	(14,329)	[3,439]	{1,719}	72,090	(14,418)	[3,460]	{1,730}
Monmouth	54,178	54,467	54,680	54,840	55,309	(11,062)	[2,655]	{1,327}	55,755	(11,151)	[2,676]	{1,338}	56,188	(11,238)	[2,697]	{1,349}
Morris	35,898	36,077	36,220	36,328	36,611	(7,322)	[1,757]	{879}	36,886	(7,377)	[1,771]	{885}	37,141	(7,428)	[1,783]	{891}
Ocean	55,997	56,273	56,459	56,631	57,113	(11,423)	[2,741]	{1,371}	57,571	(11,514)	[2,763]	{1,382}	58,016	(11,603)	[2,785]	{1,392}
Passaic	55,180	55,408	55,529	55,633	55,979	(11,196)	[2,687]	{1,343}	56,320	(11,264)	[2,703]	{1,352}	56,646	(11,329)	[2,719]	{1,359}
Somerset	21,848	21,937	22,034	22,090	22,259	(4,452)	[1,068]	{534}	22,422	(4,484)	[1,076]	{538}	22,581	(4,516)	[1,084]	{542}
Sussex	8,701	8,750	8,797	8,805	8,877	(1,775)	[426]	{213}	8,944	(1,789)	[429]	{215}	9,009	(1,802)	[432]	{216}
Union	54,787	55,029	55,207	55,304	55,657	(11,131)	[2,672]	{1,336}	56,001	(11,200)	[2,688]	{1,344}	56,343	(11,269)	[2,704]	{1,352}
Warren	6,713	6,736	6,768	6,792	6,837	(1,367)	[328]	{164}	6,880	(1,376)	[330]	{165}	6,920	(1,384)	[332]	{166}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966 or Stephanie Tennyson at [stephanie.tennyson@iem.com](mailto:stephanie.tennyson@iem.com) or 202-309-4257.