

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/5/21**

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 11/5/21 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.**

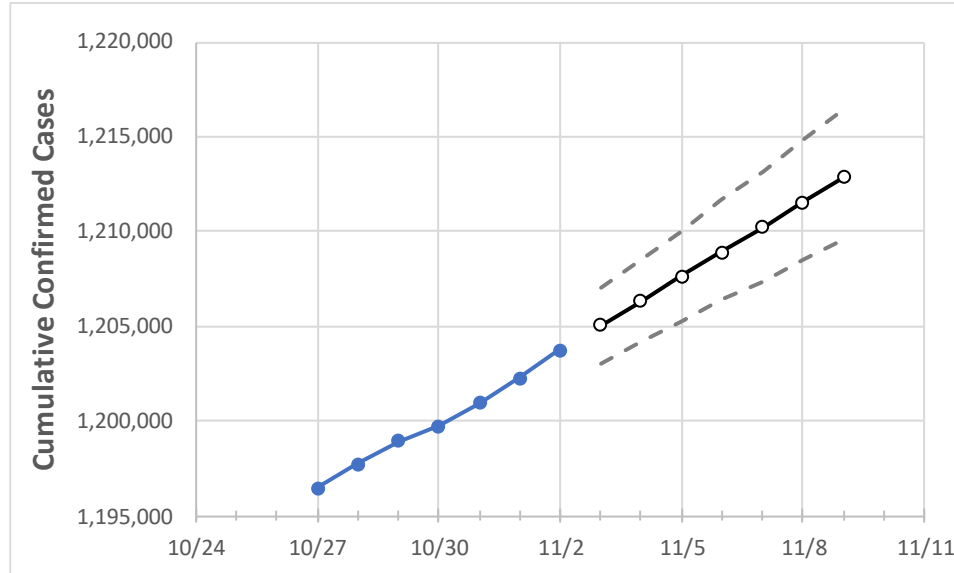
**IEM's Modeling Lead**

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:							
	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9	

New Jersey 1,199,738 1,200,953 1,202,251 1,203,755 1,205,051 1,206,326 1,207,633 1,208,908 1,210,245 1,211,538 1,212,855

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:							
	10/30	10/31	11/1	11/2	11/3	11/4	11/5	11/6	11/7	11/8	11/9	
Bergen	120,162	120,240	120,364	120,461	120,566	120,674	120,777	120,886	120,997	121,104	121,213	
Burlington	55,007	55,080	55,140	55,267	55,350	55,436	55,517	55,600	55,687	55,767	55,854	
Camden	68,441	68,526	68,628	68,729	68,829	68,929	69,025	69,123	69,227	69,330	69,429	
Essex	106,411	106,509	106,581	106,673	106,749	106,826	106,901	106,983	107,065	107,146	107,232	
Gloucester	38,609	38,683	38,753	38,822	38,890	38,961	39,029	39,100	39,170	39,243	39,314	
Hudson	97,624	97,678	97,747	97,793	97,849	97,906	97,961	98,017	98,072	98,129	98,186	
Hunterdon	12,096	12,110	12,118	12,137	12,151	12,165	12,177	12,191	12,204	12,217	12,230	
Mercer	39,658	39,718	39,778	39,838	39,885	39,932	39,981	40,029	40,078	40,125	40,176	
Middlesex	106,555	106,624	106,705	106,845	106,930	107,012	107,097	107,176	107,260	107,342	107,420	
Monmouth	92,776	92,855	93,009	93,165	93,284	93,406	93,525	93,645	93,768	93,892	94,010	
Morris	58,235	58,322	58,387	58,463	58,532	58,599	58,669	58,737	58,807	58,877	58,949	
Ocean	95,884	96,031	96,197	96,349	96,509	96,662	96,816	96,973	97,124	97,278	97,432	
Passaic	81,958	82,006	82,053	82,124	82,195	82,263	82,334	82,406	82,479	82,552	82,622	
Somerset	34,963	34,986	35,027	35,066	35,095	35,122	35,150	35,179	35,208	35,237	35,264	
Sussex	17,457	17,501	17,545	17,602	17,645	17,684	17,723	17,764	17,809	17,853	17,892	
Union	79,767	79,813	79,865	79,926	79,977	80,032	80,085	80,140	80,197	80,255	80,312	
Warren	12,237	12,259	12,276	12,295	12,314	12,332	12,350	12,368	12,385	12,403	12,421	

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:											
	10/30	10/31	11/1	11/2	11/4				11/6				11/8			
Bergen	120,162	120,240	120,364	120,461	120,674	(24,135)	[5,792]	{2,896}	120,886	(24,177)	[5,803]	{2,901}	121,104	(24,221)	[5,813]	{2,906}
Burlington	55,007	55,080	55,140	55,267	55,436	(11,087)	[2,661]	{1,330}	55,600	(11,120)	[2,669]	{1,334}	55,767	(11,153)	[2,677]	{1,338}
Camden	68,441	68,526	68,628	68,729	68,929	(13,786)	[3,309]	{1,654}	69,123	(13,825)	[3,318]	{1,659}	69,330	(13,866)	[3,328]	{1,664}
Essex	106,411	106,509	106,581	106,673	106,826	(21,365)	[5,128]	{2,564}	106,983	(21,397)	[5,135]	{2,568}	107,146	(21,429)	[5,143]	{2,572}
Gloucester	38,609	38,683	38,753	38,822	38,961	(7,792)	[1,870]	{935}	39,100	(7,820)	[1,877]	{938}	39,243	(7,849)	[1,884]	{942}
Hudson	97,624	97,678	97,747	97,793	97,906	(19,581)	[4,700]	{2,350}	98,017	(19,603)	[4,705]	{2,352}	98,129	(19,626)	[4,710]	{2,355}
Hunterdon	12,096	12,110	12,118	12,137	12,165	(2,433)	[584]	{292}	12,191	(2,438)	[585]	{293}	12,217	(2,443)	[586]	{293}
Mercer	39,658	39,718	39,778	39,838	39,932	(7,986)	[1,917]	{958}	40,029	(8,006)	[1,921]	{961}	40,125	(8,025)	[1,926]	{963}
Middlesex	106,555	106,624	106,705	106,845	107,012	(21,402)	[5,137]	{2,568}	107,176	(21,435)	[5,144]	{2,572}	107,342	(21,468)	[5,152]	{2,576}
Monmouth	92,776	92,855	93,009	93,165	93,406	(18,681)	[4,483]	{2,242}	93,645	(18,729)	[4,495]	{2,247}	93,892	(18,778)	[4,507]	{2,253}
Morris	58,235	58,322	58,387	58,463	58,599	(11,720)	[2,813]	{1,406}	58,737	(11,747)	[2,819]	{1,410}	58,877	(11,775)	[2,826]	{1,413}
Ocean	95,884	96,031	96,197	96,349	96,662	(19,332)	[4,640]	{2,320}	96,973	(19,395)	[4,655]	{2,327}	97,278	(19,456)	[4,669]	{2,335}
Passaic	81,958	82,006	82,053	82,124	82,263	(16,453)	[3,949]	{1,974}	82,406	(16,481)	[3,955]	{1,978}	82,552	(16,510)	[3,962]	{1,981}
Somerset	34,963	34,986	35,027	35,066	35,122	(7,024)	[1,686]	{843}	35,179	(7,036)	[1,689]	{844}	35,237	(7,047)	[1,691]	{846}
Sussex	17,457	17,501	17,545	17,602	17,684	(3,537)	[849]	{424}	17,764	(3,553)	[853]	{426}	17,853	(3,571)	[857]	{428}
Union	79,767	79,813	79,865	79,926	80,032	(16,006)	[3,842]	{1,921}	80,140	(16,028)	[3,847]	{1,923}	80,255	(16,051)	[3,852]	{1,926}
Warren	12,237	12,259	12,276	12,295	12,332	(2,466)	[592]	{296}	12,368	(2,474)	[594]	{297}	12,403	(2,481)	[595]	{298}

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.