

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/19/20**

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 10/19/20 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.**

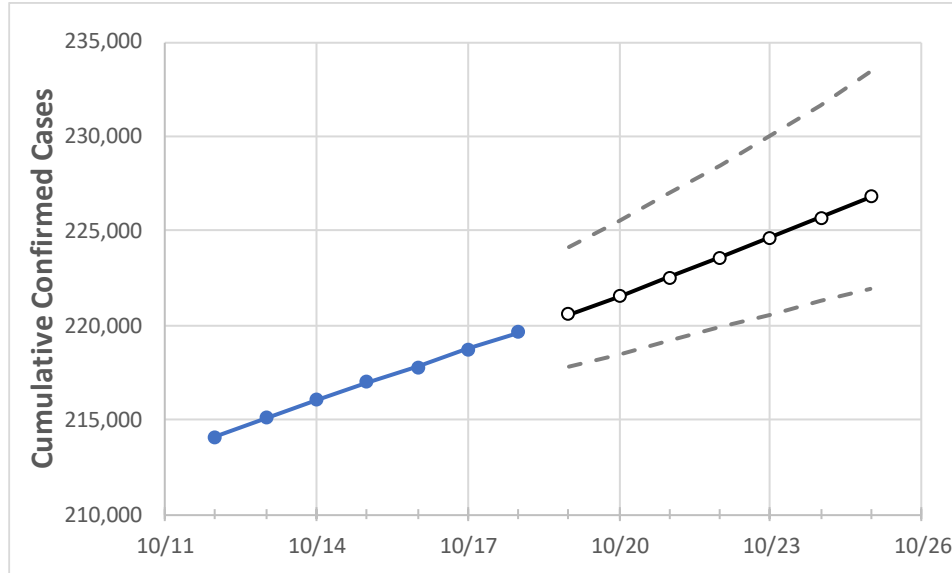
**IEM's Modeling Lead**

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:							
	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26
New Jersey	216,994	217,804	218,738	219,647	220,591	221,559	222,555	223,577	224,626	225,704	226,811	

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 20%, and are often within 10%, of actual confirmed cases.

## New Jersey Counties

	Actual Confirmed Cases On:				Projected Cases For:							
	10/15	10/16	10/17	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26
Bergen	23,495	23,569	23,639	23,738	23,834	23,934	24,039	24,149	24,263	24,383	24,508	
Burlington	7,703	7,730	7,776	7,825	7,861	7,899	7,937	7,976	8,015	8,055	8,097	
Camden	10,646	10,695	10,739	10,835	10,890	10,948	11,007	11,068	11,131	11,197	11,264	
Essex	22,129	22,227	22,345	22,479	22,602	22,734	22,876	23,026	23,188	23,360	23,544	
Gloucester	5,072	5,091	5,142	5,179	5,203	5,227	5,251	5,276	5,300	5,324	5,349	
Hudson	21,425	21,529	21,604	21,731	21,818	21,912	22,012	22,118	22,233	22,355	22,485	
Hunterdon	1,469	1,471	1,474	1,487	1,492	1,498	1,504	1,509	1,515	1,521	1,527	
Mercer	8,894	8,911	8,925	8,956	8,976	8,996	9,018	9,040	9,062	9,086	9,111	
Middlesex	20,646	20,727	20,822	20,930	21,017	21,106	21,198	21,294	21,392	21,493	21,598	
Monmouth	13,099	13,180	13,266	13,311	13,395	13,481	13,568	13,658	13,749	13,842	13,938	
Morris	8,280	8,307	8,337	8,430	8,467	8,505	8,545	8,588	8,632	8,679	8,728	
Ocean	15,684	15,752	15,832	15,952	16,061	16,171	16,281	16,391	16,502	16,614	16,726	
Passaic	19,812	19,859	19,914	19,976	20,039	20,103	20,170	20,240	20,312	20,387	20,464	
Somerset	6,089	6,092	6,110	6,142	6,153	6,165	6,176	6,188	6,200	6,211	6,223	
Sussex	1,589	1,596	1,601	1,616	1,620	1,625	1,630	1,634	1,639	1,644	1,648	
Union	18,440	18,505	18,599	18,709	18,793	18,882	18,977	19,076	19,182	19,293	19,411	
Warren	1,495	1,502	1,505	1,507	1,511	1,515	1,519	1,523	1,527	1,531	1,536	

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:											
	10/15	10/16	10/17	10/18	10/20				10/22				10/24			
Bergen	23,495	23,569	23,639	23,738	23,934	(4,787)	[1,149]	{574}	24,149	(4,830)	[1,159]	{580}	24,383	(4,877)	[1,170]	{585}
Burlington	7,703	7,730	7,776	7,825	7,899	(1,580)	[379]	{190}	7,976	(1,595)	[383]	{191}	8,055	(1,611)	[387]	{193}
Camden	10,646	10,695	10,739	10,835	10,948	(2,190)	[525]	{263}	11,068	(2,214)	[531]	{266}	11,197	(2,239)	[537]	{269}
Essex	22,129	22,227	22,345	22,479	22,734	(4,547)	[1,091]	{546}	23,026	(4,605)	[1,105]	{553}	23,360	(4,672)	[1,121]	{561}
Gloucester	5,072	5,091	5,142	5,179	5,227	(1,045)	[251]	{125}	5,276	(1,055)	[253]	{127}	5,324	(1,065)	[256]	{128}
Hudson	21,425	21,529	21,604	21,731	21,912	(4,382)	[1,052]	{526}	22,118	(4,424)	[1,062]	{531}	22,355	(4,471)	[1,073]	{537}
Hunterdon	1,469	1,471	1,474	1,487	1,498	(300)	[72]	{36}	1,509	(302)	[72]	{36}	1,521	(304)	[73]	{37}
Mercer	8,894	8,911	8,925	8,956	8,996	(1,799)	[432]	{216}	9,040	(1,808)	[434]	{217}	9,086	(1,817)	[436]	{218}
Middlesex	20,646	20,727	20,822	20,930	21,106	(4,221)	[1,013]	{507}	21,294	(4,259)	[1,022]	{511}	21,493	(4,299)	[1,032]	{516}
Monmouth	13,099	13,180	13,266	13,311	13,481	(2,696)	[647]	{324}	13,658	(2,732)	[656]	{328}	13,842	(2,768)	[664]	{332}
Morris	8,280	8,307	8,337	8,430	8,505	(1,701)	[408]	{204}	8,588	(1,718)	[412]	{206}	8,679	(1,736)	[417]	{208}
Ocean	15,684	15,752	15,832	15,952	16,171	(3,234)	[776]	{388}	16,391	(3,278)	[787]	{393}	16,614	(3,323)	[797]	{399}
Passaic	19,812	19,859	19,914	19,976	20,103	(4,021)	[965]	{482}	20,240	(4,048)	[972]	{486}	20,387	(4,077)	[979]	{489}
Somerset	6,089	6,092	6,110	6,142	6,165	(1,233)	[296]	{148}	6,188	(1,238)	[297]	{149}	6,211	(1,242)	[298]	{149}
Sussex	1,589	1,596	1,601	1,616	1,625	(325)	[78]	{39}	1,634	(327)	[78]	{39}	1,644	(329)	[79]	{39}
Union	18,440	18,505	18,599	18,709	18,882	(3,776)	[906]	{453}	19,076	(3,815)	[916]	{458}	19,293	(3,859)	[926]	{463}
Warren	1,495	1,502	1,505	1,507	1,515	(303)	[73]	{36}	1,523	(305)	[73]	{37}	1,531	(306)	[73]	{37}

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.