

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 3/29/22**

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 3/29/22 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.

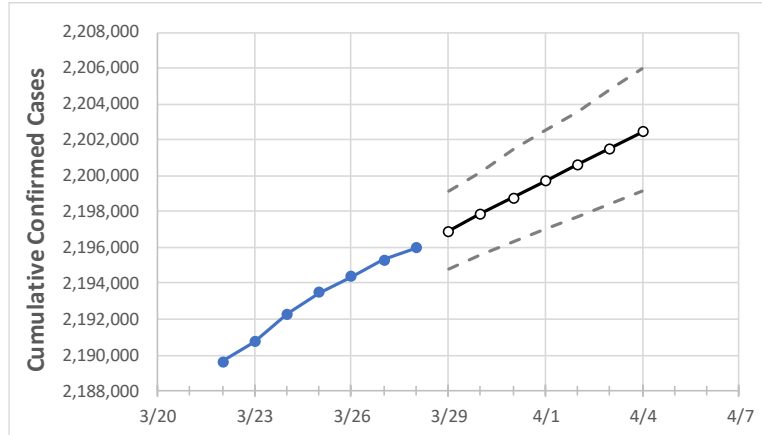
IEM's Modeling Lead

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:						
	3/25	3/26	3/27	3/28	3/29	3/30	3/31	4/1	4/2	4/3	4/4
New Jersey	2,193,470	2,194,379	2,195,320	2,195,963	2,196,913	2,197,870	2,198,784	2,199,709	2,200,618	2,201,522	2,202,454

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:							
	3/25	3/26	3/27	3/28	3/29	3/30	3/31	4/1	4/2	4/3	4/4	
Bergen	221,996	222,128	222,295	222,380	222,538	222,692	222,849	223,004	223,165	223,324	223,479	
Burlington	101,659	101,700	101,732	101,756	101,788	101,821	101,853	101,885	101,918	101,951	101,982	
Camden	125,065	125,097	125,133	125,154	125,187	125,219	125,250	125,283	125,313	125,344	125,378	
Essex	211,374	211,467	211,554	211,625	211,711	211,796	211,889	211,968	212,057	212,146	212,232	
Gloucester	69,505	69,518	69,528	69,537	69,552	69,566	69,581	69,595	69,610	69,623	69,636	
Hudson	170,526	170,596	170,680	170,715	170,805	170,885	170,970	171,051	171,137	171,221	171,306	
Hunterdon	24,440	24,458	24,466	24,475	24,491	24,506	24,521	24,536	24,552	24,568	24,583	
Mercer	75,558	75,620	75,681	75,704	75,743	75,781	75,817	75,856	75,892	75,931	75,969	
Middlesex	191,719	191,808	191,896	191,961	192,055	192,151	192,242	192,333	192,425	192,515	192,612	
Monmouth	162,889	162,967	163,043	163,105	163,177	163,248	163,319	163,390	163,463	163,537	163,609	
Morris	117,864	117,921	117,999	118,059	118,128	118,199	118,268	118,336	118,409	118,479	118,553	
Ocean	161,147	161,202	161,246	161,278	161,325	161,375	161,424	161,469	161,519	161,565	161,611	
Passaic	144,025	144,070	144,105	144,134	144,203	144,255	144,316	144,372	144,428	144,494	144,554	
Somerset	67,269	67,312	67,337	67,359	67,400	67,441	67,479	67,519	67,563	67,602	67,644	
Sussex	33,691	33,703	33,726	33,742	33,752	33,763	33,773	33,783	33,793	33,805	33,814	
Union	144,059	144,108	144,164	144,219	144,272	144,327	144,381	144,435	144,490	144,545	144,594	
Warren	23,770	23,778	23,783	23,791	23,811	23,833	23,851	23,869	23,888	23,913	23,935	

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:											
	3/25	3/26	3/27	3/28	3/30				4/1				4/3			
Bergen	221,996	222,128	222,295	222,380	222,692	(44,538)	[10,689]	{5,345}	223,004	(44,601)	[10,704]	{5,352}	223,324	(44,665)	[10,720]	{5,360}
Burlington	101,659	101,700	101,732	101,756	101,821	(20,364)	[4,887]	{2,444}	101,885	(20,377)	[4,890]	{2,445}	101,951	(20,390)	[4,894]	{2,447}
Camden	125,065	125,097	125,133	125,154	125,219	(25,044)	[6,011]	{3,005}	125,283	(25,057)	[6,014]	{3,007}	125,344	(25,069)	[6,017]	{3,008}
Essex	211,374	211,467	211,554	211,625	211,796	(42,359)	[10,166]	{5,083}	211,968	(42,394)	[10,174]	{5,087}	212,146	(42,429)	[10,183]	{5,092}
Gloucester	69,505	69,518	69,528	69,537	69,566	(13,913)	[3,339]	{1,670}	69,595	(13,919)	[3,341]	{1,670}	69,623	(13,925)	[3,342]	{1,671}
Hudson	170,526	170,596	170,680	170,715	170,885	(34,177)	[8,202]	{4,101}	171,051	(34,210)	[8,210]	{4,105}	171,221	(34,244)	[8,219]	{4,109}
Hunterdon	24,440	24,458	24,466	24,475	24,506	(4,901)	[1,176]	{588}	24,536	(4,907)	[1,178]	{589}	24,568	(4,914)	[1,179]	{590}
Mercer	75,558	75,620	75,681	75,704	75,781	(15,156)	[3,637]	{1,819}	75,856	(15,171)	[3,641]	{1,821}	75,931	(15,186)	[3,645]	{1,822}
Middlesex	191,719	191,808	191,896	191,961	192,151	(38,430)	[9,223]	{4,612}	192,333	(38,467)	[9,232]	{4,616}	192,515	(38,503)	[9,241]	{4,620}
Monmouth	162,889	162,967	163,043	163,105	163,248	(32,650)	[7,836]	{3,918}	163,390	(32,678)	[7,843]	{3,921}	163,537	(32,707)	[7,850]	{3,925}
Morris	117,864	117,921	117,999	118,059	118,199	(23,640)	[5,674]	{2,837}	118,336	(23,667)	[5,680]	{2,840}	118,479	(23,696)	[5,687]	{2,844}
Ocean	161,147	161,202	161,246	161,278	161,375	(32,275)	[7,746]	{3,873}	161,469	(32,294)	[7,751]	{3,875}	161,565	(32,313)	[7,755]	{3,878}
Passaic	144,025	144,070	144,105	144,134	144,255	(28,851)	[6,924]	{3,462}	144,372	(28,874)	[6,930]	{3,465}	144,494	(28,899)	[6,936]	{3,468}
Somerset	67,269	67,312	67,337	67,359	67,441	(13,488)	[3,237]	{1,619}	67,519	(13,504)	[3,241]	{1,620}	67,602	(13,520)	[3,245]	{1,622}
Sussex	33,691	33,703	33,726	33,742	33,763	(6,753)	[1,621]	{810}	33,783	(6,757)	[1,622]	{811}	33,805	(6,761)	[1,623]	{811}
Union	144,059	144,108	144,164	144,219	144,327	(28,865)	[6,928]	{3,464}	144,435	(28,887)	[6,933]	{3,466}	144,545	(28,909)	[6,938]	{3,469}
Warren	23,770	23,778	23,783	23,791	23,833	(4,767)	[1,144]	{572}	23,869	(4,774)	[1,146]	{573}	23,913	(4,783)	[1,148]	{574}

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