

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 2/18/22**

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 2/18/22 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.**

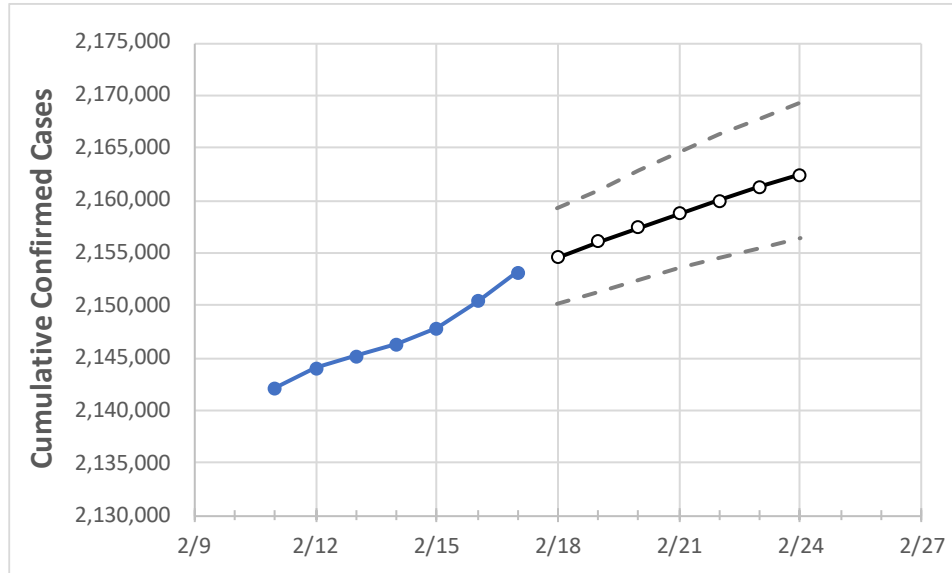
**IEM's Modeling Lead**

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:						
	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24

New Jersey 2,146,285 2,147,857 2,150,351 2,153,093 2,154,599 2,156,109 2,157,443 2,158,769 2,160,009 2,161,258 2,162,427

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:						
	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21	2/22	2/23	2/24
Bergen	216,281	216,472	216,644	216,882	217,023	217,168	217,294	217,423	217,542	217,661	217,776
Burlington	99,877	99,977	100,072	100,219	100,328	100,429	100,526	100,622	100,713	100,808	100,884
Camden	123,220	123,276	123,373	123,487	123,577	123,662	123,742	123,820	123,895	123,965	124,032
Essex	207,375	207,506	207,671	207,838	207,931	208,024	208,109	208,188	208,267	208,345	208,413
Gloucester	68,399	68,462	68,498	68,570	68,623	68,673	68,720	68,768	68,807	68,851	68,890
Hudson	166,172	166,285	166,403	166,582	166,661	166,741	166,817	166,895	166,960	167,030	167,090
Hunterdon	23,866	23,884	23,902	23,922	23,941	23,957	23,974	23,990	24,006	24,020	24,034
Mercer	73,851	73,931	74,010	74,095	74,161	74,220	74,276	74,333	74,387	74,439	74,490
Middlesex	186,458	186,633	186,816	187,086	187,230	187,367	187,491	187,623	187,744	187,864	187,972
Monmouth	160,177	160,273	160,365	160,496	160,593	160,689	160,783	160,869	160,955	161,033	161,106
Morris	115,158	115,251	115,318	115,417	115,494	115,571	115,639	115,708	115,775	115,835	115,897
Ocean	158,557	158,650	158,739	158,865	158,960	159,045	159,126	159,203	159,283	159,353	159,418
Passaic	141,315	141,408	141,512	141,670	141,738	141,810	141,879	141,943	142,002	142,063	142,118
Somerset	65,685	65,718	65,776	65,836	65,875	65,914	65,948	65,983	66,018	66,049	66,077
Sussex	33,087	33,110	33,129	33,163	33,183	33,201	33,219	33,237	33,253	33,269	33,284
Union	139,401	139,571	140,555	141,229	141,420	141,597	141,748	141,924	142,091	142,262	142,426
Warren	23,311	23,327	23,344	23,364	23,379	23,394	23,408	23,421	23,434	23,447	23,459

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:											
	2/14	2/15	2/16	2/17	2/19				2/21				2/23			
Bergen	216,281	216,472	216,644	216,882	217,168	(43,434)	[10,424]	{5,212}	217,423	(43,485)	[10,436]	{5,218}	217,661	(43,532)	[10,448]	{5,224}
Burlington	99,877	99,977	100,072	100,219	100,429	(20,086)	[4,821]	{2,410}	100,622	(20,124)	[4,830]	{2,415}	100,808	(20,162)	[4,839]	{2,419}
Camden	123,220	123,276	123,373	123,487	123,662	(24,732)	[5,936]	{2,968}	123,820	(24,764)	[5,943]	{2,972}	123,965	(24,793)	[5,950]	{2,975}
Essex	207,375	207,506	207,671	207,838	208,024	(41,605)	[9,985]	{4,993}	208,188	(41,638)	[9,993]	{4,997}	208,345	(41,669)	[10,001]	{5,000}
Gloucester	68,399	68,462	68,498	68,570	68,673	(13,735)	[3,296]	{1,648}	68,768	(13,754)	[3,301]	{1,650}	68,851	(13,770)	[3,305]	{1,652}
Hudson	166,172	166,285	166,403	166,582	166,741	(33,348)	[8,004]	{4,002}	166,895	(33,379)	[8,011]	{4,005}	167,030	(33,406)	[8,017]	{4,009}
Hunterdon	23,866	23,884	23,902	23,922	23,957	(4,791)	[1,150]	{575}	23,990	(4,798)	[1,152]	{576}	24,020	(4,804)	[1,153]	{576}
Mercer	73,851	73,931	74,010	74,095	74,220	(14,844)	[3,563]	{1,781}	74,333	(14,867)	[3,568]	{1,784}	74,439	(14,888)	[3,573]	{1,787}
Middlesex	186,458	186,633	186,816	187,086	187,367	(37,473)	[8,994]	{4,497}	187,623	(37,525)	[9,006]	{4,503}	187,864	(37,573)	[9,017]	{4,509}
Monmouth	160,177	160,273	160,365	160,496	160,689	(32,138)	[7,713]	{3,857}	160,869	(32,174)	[7,722]	{3,861}	161,033	(32,207)	[7,730]	{3,865}
Morris	115,158	115,251	115,318	115,417	115,571	(23,114)	[5,547]	{2,774}	115,708	(23,142)	[5,554]	{2,777}	115,835	(23,167)	[5,560]	{2,780}
Ocean	158,557	158,650	158,739	158,865	159,045	(31,809)	[7,634]	{3,817}	159,203	(31,841)	[7,642]	{3,821}	159,353	(31,871)	[7,649]	{3,824}
Passaic	141,315	141,408	141,512	141,670	141,810	(28,362)	[6,807]	{3,403}	141,943	(28,389)	[6,813]	{3,407}	142,063	(28,413)	[6,819]	{3,410}
Somerset	65,685	65,718	65,776	65,836	65,914	(13,183)	[3,164]	{1,582}	65,983	(13,197)	[3,167]	{1,584}	66,049	(13,210)	[3,170]	{1,585}
Sussex	33,087	33,110	33,129	33,163	33,201	(6,640)	[1,594]	{797}	33,237	(6,647)	[1,595]	{798}	33,269	(6,654)	[1,597]	{798}
Union	139,401	139,571	140,555	141,229	141,597	(28,319)	[6,797]	{3,398}	141,924	(28,385)	[6,812]	{3,406}	142,262	(28,452)	[6,829]	{3,414}
Warren	23,311	23,327	23,344	23,364	23,394	(4,679)	[1,123]	{561}	23,421	(4,684)	[1,124]	{562}	23,447	(4,689)	[1,125]	{563}

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.