

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 10/5/20**

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 10/5/20 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.**

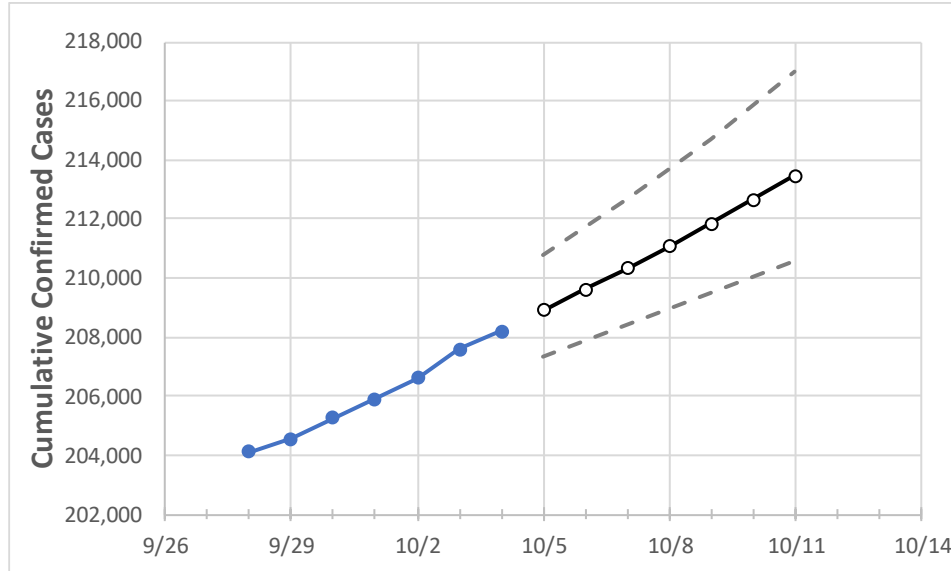
**IEM's Modeling Lead**

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:						
	10/1	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11
New Jersey	205,889	206,629	207,576	208,202	208,893	209,603	210,334	211,087	211,860	212,656	213,475

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:						
	10/1	10/2	10/3	10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11
Bergen	22,579	22,633	22,692	22,734	22,787	22,842	22,900	22,960	23,023	23,089	23,157
Burlington	7,208	7,248	7,281	7,306	7,333	7,359	7,386	7,413	7,440	7,468	7,495
Camden	9,996	10,035	10,085	10,124	10,156	10,189	10,223	10,257	10,291	10,327	10,363
Essex	21,157	21,201	21,260	21,330	21,371	21,414	21,458	21,504	21,552	21,601	21,652
Gloucester	4,710	4,729	4,772	4,787	4,814	4,840	4,867	4,894	4,920	4,946	4,972
Hudson	20,767	20,804	20,869	20,897	20,932	20,969	21,007	21,047	21,089	21,133	21,178
Hunterdon	1,349	1,367	1,382	1,388	1,396	1,404	1,413	1,423	1,433	1,443	1,454
Mercer	8,675	8,686	8,711	8,721	8,732	8,742	8,753	8,764	8,775	8,786	8,797
Middlesex	19,679	19,766	19,858	19,904	19,979	20,057	20,138	20,223	20,312	20,405	20,501
Monmouth	12,025	12,081	12,171	12,224	12,283	12,344	12,407	12,472	12,539	12,607	12,678
Morris	7,920	7,941	7,967	7,986	8,006	8,027	8,049	8,071	8,093	8,117	8,141
Ocean	13,718	13,898	14,100	14,244	14,436	14,640	14,857	15,088	15,334	15,597	15,876
Passaic	19,135	19,161	19,210	19,237	19,269	19,302	19,335	19,370	19,405	19,441	19,478
Somerset	5,850	5,873	5,892	5,907	5,924	5,941	5,959	5,977	5,995	6,014	6,033
Sussex	1,517	1,526	1,538	1,538	1,546	1,554	1,562	1,571	1,581	1,591	1,602
Union	17,761	17,789	17,832	17,870	17,909	17,950	17,993	18,038	18,085	18,134	18,185
Warren	1,449	1,453	1,456	1,458	1,460	1,462	1,464	1,466	1,469	1,471	1,473

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:											
	10/1	10/2	10/3	10/4	10/6				10/8				10/10			
Bergen	22,579	22,633	22,692	22,734	22,842	(4,568)	[1,096]	{548}	22,960	(4,592)	[1,102]	{551}	23,089	(4,618)	[1,108]	{554}
Burlington	7,208	7,248	7,281	7,306	7,359	(1,472)	[353]	{177}	7,413	(1,483)	[356]	{178}	7,468	(1,494)	[358]	{179}
Camden	9,996	10,035	10,085	10,124	10,189	(2,038)	[489]	{245}	10,257	(2,051)	[492]	{246}	10,327	(2,065)	[496]	{248}
Essex	21,157	21,201	21,260	21,330	21,414	(4,283)	[1,028]	{514}	21,504	(4,301)	[1,032]	{516}	21,601	(4,320)	[1,037]	{518}
Gloucester	4,710	4,729	4,772	4,787	4,840	(968)	[232]	{116}	4,894	(979)	[235]	{117}	4,946	(989)	[237]	{119}
Hudson	20,767	20,804	20,869	20,897	20,969	(4,194)	[1,006]	{503}	21,047	(4,209)	[1,010]	{505}	21,133	(4,227)	[1,014]	{507}
Hunterdon	1,349	1,367	1,382	1,388	1,404	(281)	[67]	{34}	1,423	(285)	[68]	{34}	1,443	(289)	[69]	{35}
Mercer	8,675	8,686	8,711	8,721	8,742	(1,748)	[420]	{210}	8,764	(1,753)	[421]	{210}	8,786	(1,757)	[422]	{211}
Middlesex	19,679	19,766	19,858	19,904	20,057	(4,011)	[963]	{481}	20,223	(4,045)	[971]	{485}	20,405	(4,081)	[979]	{490}
Monmouth	12,025	12,081	12,171	12,224	12,344	(2,469)	[593]	{296}	12,472	(2,494)	[599]	{299}	12,607	(2,521)	[605]	{303}
Morris	7,920	7,941	7,967	7,986	8,027	(1,605)	[385]	{193}	8,071	(1,614)	[387]	{194}	8,117	(1,623)	[390]	{195}
Ocean	13,718	13,898	14,100	14,244	14,640	(2,928)	[703]	{351}	15,088	(3,018)	[724]	{362}	15,597	(3,119)	[749]	{374}
Passaic	19,135	19,161	19,210	19,237	19,302	(3,860)	[926]	{463}	19,370	(3,874)	[930]	{465}	19,441	(3,888)	[933]	{467}
Somerset	5,850	5,873	5,892	5,907	5,941	(1,188)	[285]	{143}	5,977	(1,195)	[287]	{143}	6,014	(1,203)	[289]	{144}
Sussex	1,517	1,526	1,538	1,538	1,554	(311)	[75]	{37}	1,571	(314)	[75]	{38}	1,591	(318)	[76]	{38}
Union	17,761	17,789	17,832	17,870	17,950	(3,590)	[862]	{431}	18,038	(3,608)	[866]	{433}	18,134	(3,627)	[870]	{435}
Warren	1,449	1,453	1,456	1,458	1,462	(292)	[70]	{35}	1,466	(293)	[70]	{35}	1,471	(294)	[71]	{35}

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.