

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 11/17/21**

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 11/17/21 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.**

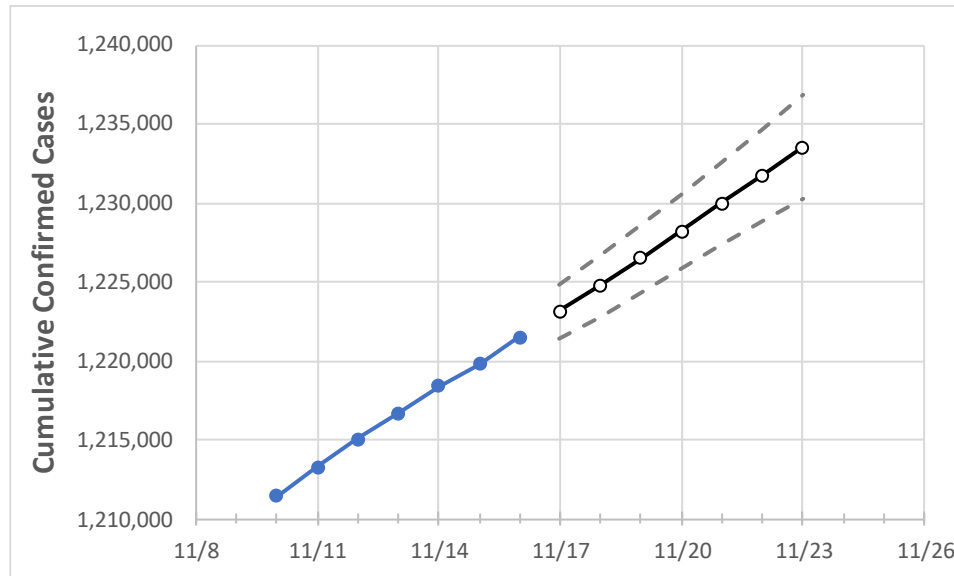
**IEM's Modeling Lead**

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:						
	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23

New Jersey 1,216,705 1,218,406 1,219,768 1,221,507 1,223,149 1,224,811 1,226,498 1,228,230 1,229,965 1,231,743 1,233,536

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:						
	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20	11/21	11/22	11/23
Bergen	121,389	121,543	121,652	121,816	121,944	122,078	122,206	122,339	122,478	122,617	122,754
Burlington	56,173	56,290	56,388	56,531	56,652	56,773	56,899	57,023	57,151	57,286	57,418
Camden	69,630	69,756	69,869	69,987	70,101	70,221	70,338	70,459	70,581	70,705	70,832
Essex	107,465	107,545	107,619	107,752	107,856	107,965	108,071	108,184	108,297	108,415	108,533
Gloucester	39,423	39,504	39,571	39,669	39,745	39,822	39,901	39,980	40,060	40,142	40,223
Hudson	98,327	98,407	98,470	98,562	98,630	98,701	98,771	98,843	98,916	98,991	99,066
Hunterdon	12,338	12,363	12,386	12,412	12,436	12,463	12,488	12,514	12,542	12,570	12,599
Mercer	40,303	40,370	40,431	40,505	40,568	40,633	40,697	40,764	40,831	40,900	40,969
Middlesex	107,783	107,911	107,982	108,095	108,206	108,324	108,439	108,556	108,676	108,795	108,920
Monmouth	94,570	94,744	94,908	95,047	95,217	95,393	95,565	95,743	95,926	96,117	96,302
Morris	59,176	59,270	59,345	59,453	59,549	59,647	59,747	59,850	59,955	60,065	60,173
Ocean	97,846	98,015	98,174	98,364	98,540	98,715	98,890	99,071	99,247	99,431	99,609
Passaic	82,646	82,734	82,779	82,848	82,910	82,968	83,029	83,090	83,150	83,213	83,274
Somerset	35,401	35,452	35,490	35,547	35,595	35,644	35,695	35,747	35,800	35,856	35,912
Sussex	18,017	18,048	18,077	18,118	18,166	18,214	18,260	18,310	18,358	18,410	18,461
Union	80,510	80,574	80,628	80,694	80,767	80,840	80,915	80,991	81,070	81,149	81,230
Warren	12,525	12,551	12,569	12,594	12,621	12,647	12,674	12,701	12,730	12,757	12,786

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:											
	11/13	11/14	11/15	11/16	11/18				11/20				11/22			
Bergen	121,389	121,543	121,652	121,816	122,078	(24,416)	[5,860]	{2,930}	122,339	(24,468)	[5,872]	{2,936}	122,617	(24,523)	[5,886]	{2,943}
Burlington	56,173	56,290	56,388	56,531	56,773	(11,355)	[2,725]	{1,363}	57,023	(11,405)	[2,737]	{1,369}	57,286	(11,457)	[2,750]	{1,375}
Camden	69,630	69,756	69,869	69,987	70,221	(14,044)	[3,371]	{1,685}	70,459	(14,092)	[3,382]	{1,691}	70,705	(14,141)	[3,394]	{1,697}
Essex	107,465	107,545	107,619	107,752	107,965	(21,593)	[5,182]	{2,591}	108,184	(21,637)	[5,193]	{2,596}	108,415	(21,683)	[5,204]	{2,602}
Gloucester	39,423	39,504	39,571	39,669	39,822	(7,964)	[1,911]	{956}	39,980	(7,996)	[1,919]	{960}	40,142	(8,028)	[1,927]	{963}
Hudson	98,327	98,407	98,470	98,562	98,701	(19,740)	[4,738]	{2,369}	98,843	(19,769)	[4,744]	{2,372}	98,991	(19,798)	[4,752]	{2,376}
Hunterdon	12,338	12,363	12,386	12,412	12,463	(2,493)	[598]	{299}	12,514	(2,503)	[601]	{300}	12,570	(2,514)	[603]	{302}
Mercer	40,303	40,370	40,431	40,505	40,633	(8,127)	[1,950]	{975}	40,764	(8,153)	[1,957]	{978}	40,900	(8,180)	[1,963]	{982}
Middlesex	107,783	107,911	107,982	108,095	108,324	(21,665)	[5,200]	{2,600}	108,556	(21,711)	[5,211]	{2,605}	108,795	(21,759)	[5,222]	{2,611}
Monmouth	94,570	94,744	94,908	95,047	95,393	(19,079)	[4,579]	{2,289}	95,743	(19,149)	[4,596]	{2,298}	96,117	(19,223)	[4,614]	{2,307}
Morris	59,176	59,270	59,345	59,453	59,647	(11,929)	[2,863]	{1,432}	59,850	(11,970)	[2,873]	{1,436}	60,065	(12,013)	[2,883]	{1,442}
Ocean	97,846	98,015	98,174	98,364	98,715	(19,743)	[4,738]	{2,369}	99,071	(19,814)	[4,755]	{2,378}	99,431	(19,886)	[4,773]	{2,386}
Passaic	82,646	82,734	82,779	82,848	82,968	(16,594)	[3,982]	{1,991}	83,090	(16,618)	[3,988]	{1,994}	83,213	(16,643)	[3,994]	{1,997}
Somerset	35,401	35,452	35,490	35,547	35,644	(7,129)	[1,711]	{855}	35,747	(7,149)	[1,716]	{858}	35,856	(7,171)	[1,721]	{861}
Sussex	18,017	18,048	18,077	18,118	18,214	(3,643)	[874]	{437}	18,310	(3,662)	[879]	{439}	18,410	(3,682)	[884]	{442}
Union	80,510	80,574	80,628	80,694	80,840	(16,168)	[3,880]	{1,940}	80,991	(16,198)	[3,888]	{1,944}	81,149	(16,230)	[3,895]	{1,948}
Warren	12,525	12,551	12,569	12,594	12,647	(2,529)	[607]	{304}	12,701	(2,540)	[610]	{305}	12,757	(2,551)	[612]	{306}

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.