

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 8/18/21**

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 8/18/21 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.

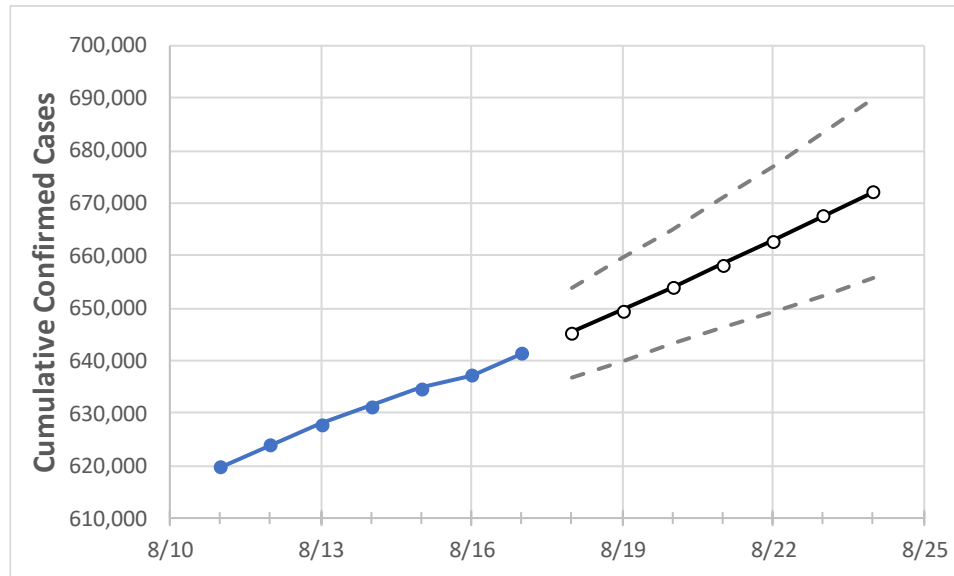
IEM's Modeling Lead

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.

Alabama State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24
Alabama	631,401	634,897	637,363	641,386	645,498	649,603	653,944	658,437	662,993	667,629	672,299

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.

Alabama Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	8/14	8/15	8/16	8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24
Jefferson	91,152	91,744	92,177	92,736	93,341	93,968	94,617	95,297	95,994	96,717	97,459
Lee	18,327	18,400	18,461	18,623	18,736	18,855	18,982	19,109	19,244	19,384	19,525
Madison	39,505	39,694	39,852	40,001	40,198	40,402	40,615	40,834	41,055	41,285	41,522
Marshall	13,987	14,036	14,060	14,163	14,246	14,333	14,422	14,516	14,614	14,716	14,821
Mobile	56,466	56,968	57,253	57,593	58,149	58,714	59,281	59,836	60,395	60,964	61,533
Montgomery	27,683	27,830	27,968	28,092	28,261	28,436	28,619	28,810	29,011	29,222	29,441
Shelby	29,091	29,284	29,401	29,561	29,737	29,915	30,098	30,285	30,476	30,674	30,879
Tuscaloosa	28,339	28,416	28,454	28,597	28,698	28,801	28,908	29,016	29,127	29,239	29,353

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.

Alabama Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	8/14	8/15	8/16	8/17	8/19			8/21			8/23					
Jefferson	91,152	91,744	92,177	92,736	93,968	(18,794)	[4,510]	{2,255}	95,297	(19,059)	[4,574]	{2,287}	96,717	(19,343)	[4,642]	{2,321}
Lee	18,327	18,400	18,461	18,623	18,855	(3,771)	[905]	{453}	19,109	(3,822)	[917]	{459}	19,384	(3,877)	[930]	{465}
Madison	39,505	39,694	39,852	40,001	40,402	(8,080)	[1,939]	{970}	40,834	(8,167)	[1,960]	{980}	41,285	(8,257)	[1,982]	{991}
Marshall	13,987	14,036	14,060	14,163	14,333	(2,867)	[688]	{344}	14,516	(2,903)	[697]	{348}	14,716	(2,943)	[706]	{353}
Mobile	56,466	56,968	57,253	57,593	58,714	(11,743)	[2,818]	{1,409}	59,836	(11,967)	[2,872]	{1,436}	60,964	(12,193)	[2,926]	{1,463}
Montgomery	27,683	27,830	27,968	28,092	28,436	(5,687)	[1,365]	{682}	28,810	(5,762)	[1,383]	{691}	29,222	(5,844)	[1,403]	{701}
Shelby	29,091	29,284	29,401	29,561	29,915	(5,983)	[1,436]	{718}	30,285	(6,057)	[1,454]	{727}	30,674	(6,135)	[1,472]	{736}
Tuscaloosa	28,339	28,416	28,454	28,597	28,801	(5,760)	[1,382]	{691}	29,016	(5,803)	[1,393]	{696}	29,239	(5,848)	[1,403]	{702}

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.