

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 8/11/21**

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 8/11/21 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.

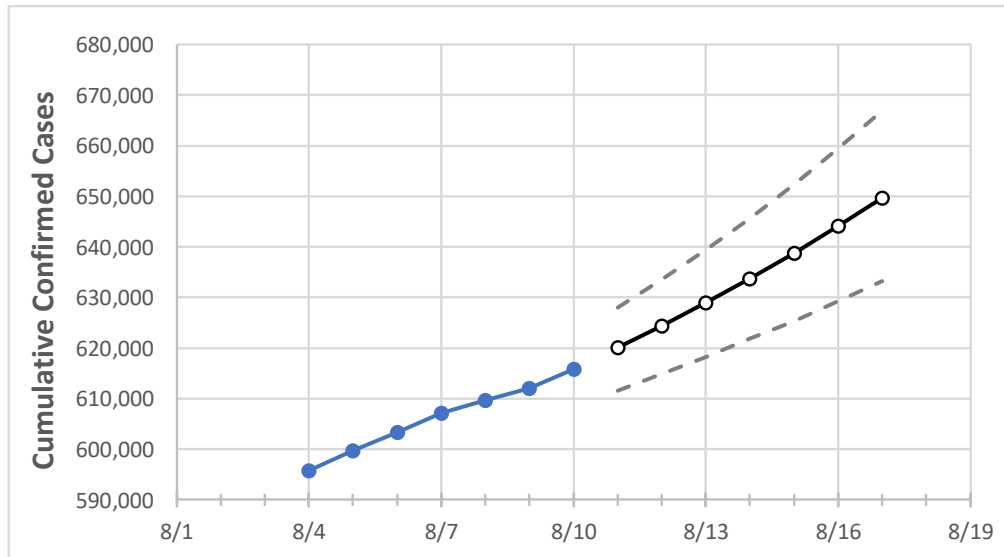
IEM's Modeling Lead

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:						
	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17
Alabama	607,209	609,648	612,086	615,901	620,037	624,374	628,959	633,740	638,786	644,078	649,637

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:						
	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17
Jefferson	87,843	88,182	88,521	89,043	89,580	90,146	90,759	91,400	92,073	92,791	93,546
Lee	17,682	17,740	17,797	17,908	18,011	18,119	18,237	18,362	18,491	18,630	18,777
Madison	38,351	38,444	38,537	38,817	39,003	39,197	39,403	39,618	39,853	40,098	40,343
Marshall	13,491	13,537	13,582	13,653	13,734	13,821	13,910	14,009	14,111	14,219	14,334
Mobile	52,660	53,094	53,527	54,087	54,841	55,619	56,437	57,307	58,235	59,196	60,189
Montgomery	26,769	26,861	26,953	27,102	27,238	27,380	27,534	27,695	27,867	28,048	28,241
Shelby	28,122	28,229	28,336	28,472	28,637	28,811	28,996	29,187	29,388	29,596	29,811
Tuscaloosa	27,714	27,784	27,853	27,943	28,056	28,173	28,302	28,432	28,571	28,713	28,870

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:											
	8/7	8/8	8/9	8/10	8/12				8/14				8/16			
Jefferson	87,843	88,182	88,521	89,043	90,146	(18,029)	[4,327]	{2,163}	91,400	(18,280)	[4,387]	{2,194}	92,791	(18,558)	[4,454]	{2,227}
Lee	17,682	17,740	17,797	17,908	18,119	(3,624)	[870]	{435}	18,362	(3,672)	[881]	{441}	18,630	(3,726)	[894]	{447}
Madison	38,351	38,444	38,537	38,817	39,197	(7,839)	[1,881]	{941}	39,618	(7,924)	[1,902]	{951}	40,098	(8,020)	[1,925]	{962}
Marshall	13,491	13,537	13,582	13,653	13,821	(2,764)	[663]	{332}	14,009	(2,802)	[672]	{336}	14,219	(2,844)	[682]	{341}
Mobile	52,660	53,094	53,527	54,087	55,619	(11,124)	[2,670]	{1,335}	57,307	(11,461)	[2,751]	{1,375}	59,196	(11,839)	[2,841]	{1,421}
Montgomery	26,769	26,861	26,953	27,102	27,380	(5,476)	[1,314]	{657}	27,695	(5,539)	[1,329]	{665}	28,048	(5,610)	[1,346]	{673}
Shelby	28,122	28,229	28,336	28,472	28,811	(5,762)	[1,383]	{691}	29,187	(5,837)	[1,401]	{700}	29,596	(5,919)	[1,421]	{710}
Tuscaloosa	27,714	27,784	27,853	27,943	28,173	(5,635)	[1,352]	{676}	28,432	(5,686)	[1,365]	{682}	28,713	(5,743)	[1,378]	{689}

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.