

## **IEM's AI Modeling: Short-term COVID-19 Projections**

**Date: 8/4/21**

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 8/4/21 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.**

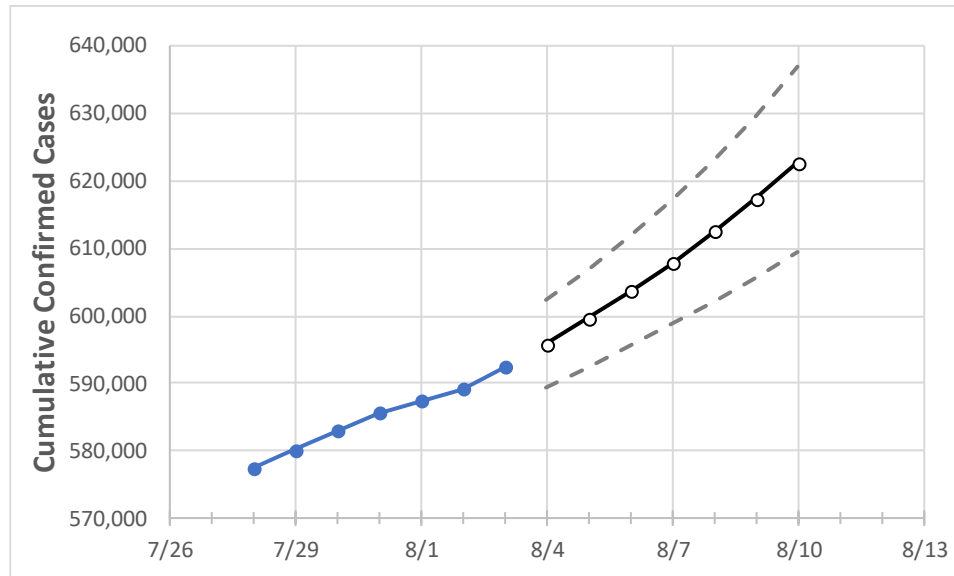
### **IEM's Modeling Lead**

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:							
	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	
Alabama	585,607	587,405	589,110	592,417	595,862	599,629	603,599	607,820	612,498	617,335	622,619	

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:							
	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	
Jefferson	85,143	85,385	85,603	86,109	86,568	87,071	87,614	88,198	88,830	89,523	90,284	
Lee	17,184	17,224	17,260	17,336	17,416	17,502	17,594	17,693	17,800	17,916	18,040	
Madison	37,411	37,517	37,603	37,714	37,855	38,004	38,163	38,327	38,505	38,694	38,890	
Marshall	13,079	13,116	13,136	13,198	13,259	13,326	13,399	13,477	13,562	13,653	13,750	
Mobile	48,584	48,932	49,268	49,771	50,355	50,977	51,635	52,332	53,087	53,884	54,724	
Montgomery	26,119	26,172	26,252	26,343	26,435	26,533	26,638	26,749	26,867	26,993	27,127	
Shelby	27,192	27,280	27,362	27,501	27,632	27,775	27,926	28,087	28,259	28,442	28,634	
Tuscaloosa	27,145	27,171	27,208	27,344	27,452	27,570	27,702	27,847	28,002	28,173	28,364	

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:											
	7/31	8/1	8/2	8/3	8/5				8/7				8/9			
Jefferson	85,143	85,385	85,603	86,109	87,071	(17,414)	[4,179]	{2,090}	88,198	(17,640)	[4,234]	{2,117}	89,523	(17,905)	[4,297]	{2,149}
Lee	17,184	17,224	17,260	17,336	17,502	(3,500)	[840]	{420}	17,693	(3,539)	[849]	{425}	17,916	(3,583)	[860]	{430}
Madison	37,411	37,517	37,603	37,714	38,004	(7,601)	[1,824]	{912}	38,327	(7,665)	[1,840]	{920}	38,694	(7,739)	[1,857]	{929}
Marshall	13,079	13,116	13,136	13,198	13,326	(2,665)	[640]	{320}	13,477	(2,695)	[647]	{323}	13,653	(2,731)	[655]	{328}
Mobile	48,584	48,932	49,268	49,771	50,977	(10,195)	[2,447]	{1,223}	52,332	(10,466)	[2,512]	{1,256}	53,884	(10,777)	[2,586]	{1,293}
Montgomery	26,119	26,172	26,252	26,343	26,533	(5,307)	[1,274]	{637}	26,749	(5,350)	[1,284]	{642}	26,993	(5,399)	[1,296]	{648}
Shelby	27,192	27,280	27,362	27,501	27,775	(5,555)	[1,333]	{667}	28,087	(5,617)	[1,348]	{674}	28,442	(5,688)	[1,365]	{683}
Tuscaloosa	27,145	27,171	27,208	27,344	27,570	(5,514)	[1,323]	{662}	27,847	(5,569)	[1,337]	{668}	28,173	(5,635)	[1,352]	{676}

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.