

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

**Date: 3/8/22**

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 3/8/22 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.**

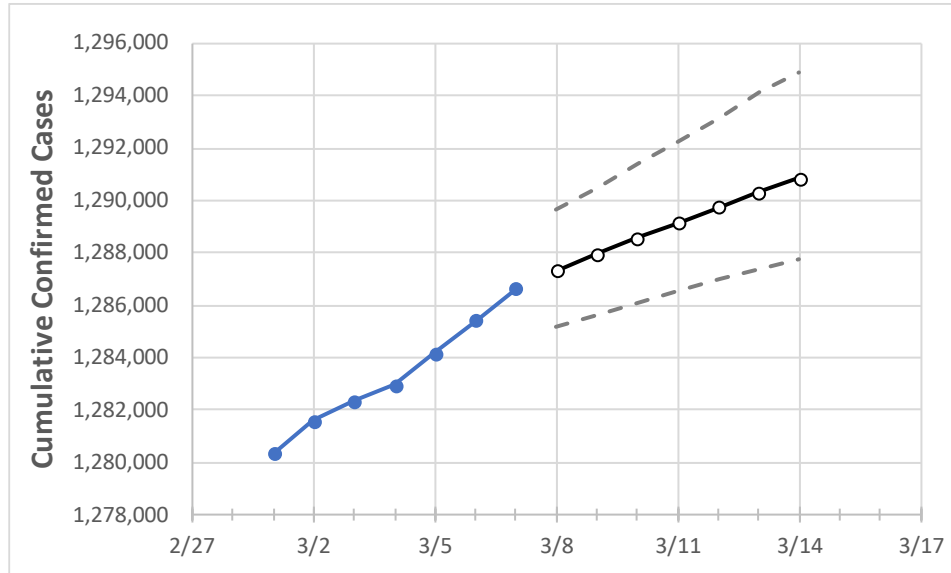
### **IEM's Modeling Lead**

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:						
	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14
Alabama	1,282,945	1,284,182	1,285,418	1,286,655	1,287,341	1,287,978	1,288,595	1,289,159	1,289,745	1,290,319	1,290,851

*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:							
	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14	
Jefferson	182,156	182,641	183,126	183,611	183,729	183,846	183,972	184,084	184,187	184,322	184,423	
Lee	37,544	37,547	37,551	37,554	37,558	37,562	37,566	37,570	37,573	37,576	37,579	
Madison	88,436	88,458	88,479	88,501	88,541	88,575	88,611	88,645	88,675	88,712	88,735	
Marshall	27,126	27,130	27,134	27,138	27,142	27,146	27,149	27,152	27,155	27,158	27,161	
Mobile	112,704	112,742	112,779	112,817	112,902	112,982	113,047	113,126	113,200	113,266	113,334	
Montgomery	54,452	54,462	54,472	54,482	54,497	54,512	54,525	54,539	54,551	54,563	54,575	
Shelby	58,902	59,261	59,619	59,978	60,098	60,219	60,339	60,455	60,589	60,724	60,849	
Tuscaloosa	54,966	54,990	55,014	55,038	55,085	55,134	55,174	55,220	55,265	55,311	55,351	

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:											
	3/4	3/5	3/6	3/7	3/9			3/11			3/13					
Jefferson	182,156	182,641	183,126	183,611	183,846	(36,769)	[8,825]	{4,412}	184,084	(36,817)	[8,836]	{4,418}	184,322	(36,864)	[8,847]	{4,424}
Lee	37,544	37,547	37,551	37,554	37,562	(7,512)	[1,803]	{901}	37,570	(7,514)	[1,803]	{902}	37,576	(7,515)	[1,804]	{902}
Madison	88,436	88,458	88,479	88,501	88,575	(17,715)	[4,252]	{2,126}	88,645	(17,729)	[4,255]	{2,127}	88,712	(17,742)	[4,258]	{2,129}
Marshall	27,126	27,130	27,134	27,138	27,146	(5,429)	[1,303]	{651}	27,152	(5,430)	[1,303]	{652}	27,158	(5,432)	[1,304]	{652}
Mobile	112,704	112,742	112,779	112,817	112,982	(22,596)	[5,423]	{2,712}	113,126	(22,625)	[5,430]	{2,715}	113,266	(22,653)	[5,437]	{2,718}
Montgomery	54,452	54,462	54,472	54,482	54,512	(10,902)	[2,617]	{1,308}	54,539	(10,908)	[2,618]	{1,309}	54,563	(10,913)	[2,619]	{1,310}
Shelby	58,902	59,261	59,619	59,978	60,219	(12,044)	[2,891]	{1,445}	60,455	(12,091)	[2,902]	{1,451}	60,724	(12,145)	[2,915]	{1,457}
Tuscaloosa	54,966	54,990	55,014	55,038	55,134	(11,027)	[2,646]	{1,323}	55,220	(11,044)	[2,651]	{1,325}	55,311	(11,062)	[2,655]	{1,327}

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.