

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

**Date: 5/12/21**

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 5/12/21 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.**

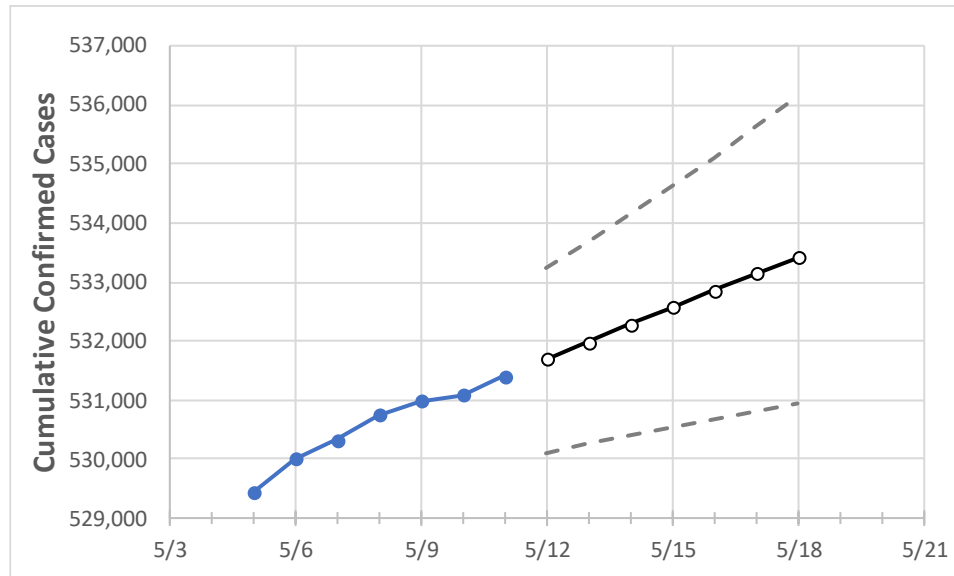
### **IEM's Modeling Lead**

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:						
	5/8	5/9	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18
Alabama	530,744	530,988	531,094	531,404	531,700	531,988	532,283	532,575	532,862	533,147	533,420

*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:						
	5/8	5/9	5/10	5/11	5/12	5/13	5/14	5/15	5/16	5/17	5/18
Jefferson	76,493	76,529	76,544	76,550	76,586	76,621	76,656	76,689	76,723	76,757	76,787
Lee	15,873	15,884	15,886	15,882	15,891	15,900	15,910	15,919	15,928	15,937	15,946
Madison	34,735	34,751	34,763	34,789	34,814	34,839	34,862	34,886	34,909	34,931	34,954
Marshall	12,213	12,222	12,227	12,232	12,240	12,248	12,256	12,263	12,271	12,279	12,286
Mobile	40,959	40,971	40,979	41,036	41,064	41,092	41,118	41,146	41,173	41,202	41,229
Montgomery	24,327	24,329	24,331	24,340	24,350	24,359	24,369	24,377	24,386	24,395	24,403
Shelby	23,425	23,431	23,440	23,449	23,460	23,471	23,481	23,492	23,503	23,513	23,524
Tuscaloosa	25,749	25,775	25,781	25,788	25,805	25,821	25,837	25,854	25,870	25,886	25,902

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:											
	5/8	5/9	5/10	5/11	5/13				5/15				5/17			
Jefferson	76,493	76,529	76,544	76,550	76,621	(15,324)	[3,678]	{1,839}	76,689	(15,338)	[3,681]	{1,841}	76,757	(15,351)	[3,684]	{1,842}
Lee	15,873	15,884	15,886	15,882	15,900	(3,180)	[763]	{382}	15,919	(3,184)	[764]	{382}	15,937	(3,187)	[765]	{382}
Madison	34,735	34,751	34,763	34,789	34,839	(6,968)	[1,672]	{836}	34,886	(6,977)	[1,675]	{837}	34,931	(6,986)	[1,677]	{838}
Marshall	12,213	12,222	12,227	12,232	12,248	(2,450)	[588]	{294}	12,263	(2,453)	[589]	{294}	12,279	(2,456)	[589]	{295}
Mobile	40,959	40,971	40,979	41,036	41,092	(8,218)	[1,972]	{986}	41,146	(8,229)	[1,975]	{988}	41,202	(8,240)	[1,978]	{989}
Montgomery	24,327	24,329	24,331	24,340	24,359	(4,872)	[1,169]	{585}	24,377	(4,875)	[1,170]	{585}	24,395	(4,879)	[1,171]	{585}
Shelby	23,425	23,431	23,440	23,449	23,471	(4,694)	[1,127]	{563}	23,492	(4,698)	[1,128]	{564}	23,513	(4,703)	[1,129]	{564}
Tuscaloosa	25,749	25,775	25,781	25,788	25,821	(5,164)	[1,239]	{620}	25,854	(5,171)	[1,241]	{620}	25,886	(5,177)	[1,243]	{621}

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.