

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

**Date: 3/15/22**

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 3/15/22 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.**

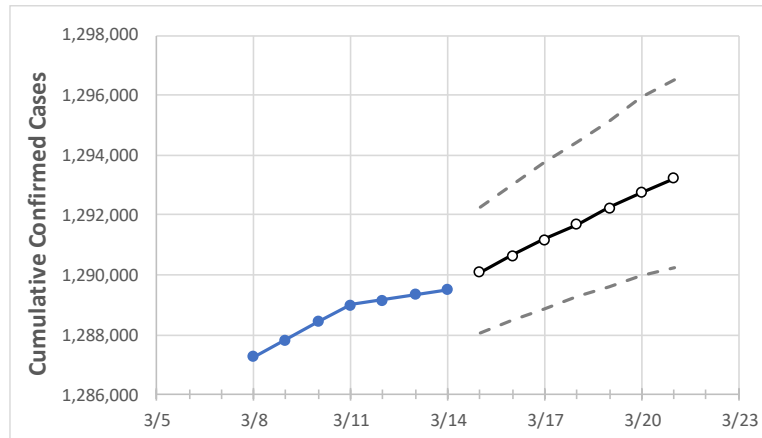
### **IEM's Modeling Lead**

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:						
	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	3/21
Alabama	1,288,999	1,289,169	1,289,340	1,289,510	1,290,091	1,290,649	1,291,197	1,291,692	1,292,251	1,292,753	1,293,244

*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:						
	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	3/21
Jefferson	183,787	183,803	183,818	183,834	183,955	184,069	184,195	184,303	184,417	184,555	184,661
Lee	37,568	37,571	37,575	37,578	37,581	37,583	37,585	37,588	37,590	37,592	37,594
Madison	88,734	88,750	88,766	88,782	88,812	88,837	88,863	88,890	88,915	88,942	88,963
Marshall	27,242	27,251	27,261	27,270	27,283	27,296	27,309	27,321	27,335	27,349	27,362
Mobile	112,899	112,910	112,920	112,931	112,969	113,009	113,033	113,056	113,096	113,125	113,147
Montgomery	54,540	54,546	54,553	54,559	54,568	54,578	54,586	54,595	54,603	54,610	54,617
Shelby	60,048	60,056	60,065	60,073	60,157	60,228	60,293	60,368	60,450	60,528	60,601
Tuscaloosa	55,427	55,431	55,436	55,440	55,491	55,542	55,586	55,635	55,683	55,729	55,775

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:											
	3/11	3/12	3/13	3/14	3/16			3/18			3/20					
Jefferson	183,787	183,803	183,818	183,834	184,069	(36,814)	[8,835]	{4,418}	184,303	(36,861)	[8,847]	{4,423}	184,555	(36,911)	[8,859]	{4,429}
Lee	37,568	37,571	37,575	37,578	37,583	(7,517)	[1,804]	{902}	37,588	(7,518)	[1,804]	{902}	37,592	(7,518)	[1,804]	{902}
Madison	88,734	88,750	88,766	88,782	88,837	(17,767)	[4,264]	{2,132}	88,890	(17,778)	[4,267]	{2,133}	88,942	(17,788)	[4,269]	{2,135}
Marshall	27,242	27,251	27,261	27,270	27,296	(5,459)	[1,310]	{655}	27,321	(5,464)	[1,311]	{656}	27,349	(5,470)	[1,313]	{656}
Mobile	112,899	112,910	112,920	112,931	113,009	(22,602)	[5,424]	{2,712}	113,056	(22,611)	[5,427]	{2,713}	113,125	(22,625)	[5,430]	{2,715}
Montgomery	54,540	54,546	54,553	54,559	54,578	(10,916)	[2,620]	{1,310}	54,595	(10,919)	[2,621]	{1,310}	54,610	(10,922)	[2,621]	{1,311}
Shelby	60,048	60,056	60,065	60,073	60,228	(12,046)	[2,891]	{1,445}	60,368	(12,074)	[2,898]	{1,449}	60,528	(12,106)	[2,905]	{1,453}
Tuscaloosa	55,427	55,431	55,436	55,440	55,542	(11,108)	[2,666]	{1,333}	55,635	(11,127)	[2,670]	{1,335}	55,729	(11,146)	[2,675]	{1,337}

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.