

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

**Date: 9/10/21**

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 9/10/21 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.**

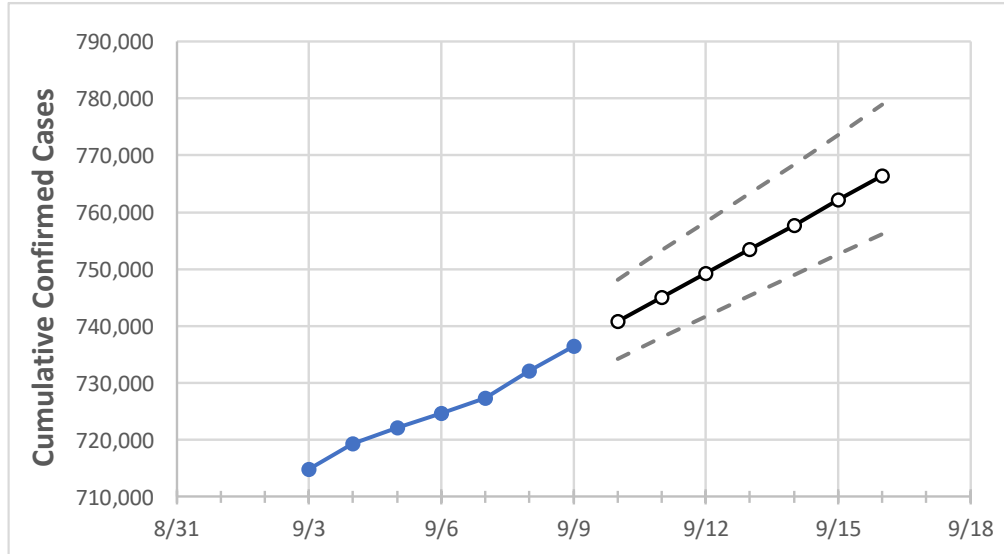
### **IEM's Modeling Lead**

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:						
	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15	9/16
Alabama	724,688	727,360	732,151	736,518	740,776	745,102	749,317	753,509	757,717	762,181	766,454

*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:						
	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15	9/16
Jefferson	104,567	104,955	105,355	105,851	106,439	107,012	107,569	108,155	108,745	109,314	109,883
Lee	20,735	20,827	20,921	21,019	21,115	21,210	21,305	21,401	21,496	21,589	21,684
Madison	45,548	45,695	45,826	46,133	46,426	46,723	47,012	47,306	47,617	47,914	48,218
Marshall	16,232	16,291	16,338	16,531	16,643	16,752	16,866	16,974	17,092	17,204	17,319
Mobile	65,549	65,716	67,156	67,486	67,899	68,271	68,653	69,057	69,450	69,839	70,187
Montgomery	31,257	31,331	31,461	31,559	31,703	31,855	31,997	32,147	32,295	32,445	32,590
Shelby	33,355	33,473	33,642	33,849	34,055	34,263	34,474	34,692	34,907	35,123	35,341
Tuscaloosa	31,169	31,248	31,446	31,649	31,832	32,016	32,202	32,401	32,601	32,807	33,020

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:											
	9/6	9/7	9/8	9/9	9/11				9/13				9/15			
Jefferson	104,567	104,955	105,355	105,851	107,012	(21,402)	[5,137]	{2,568}	108,155	(21,631)	[5,191]	{2,596}	109,314	(21,863)	[5,247]	{2,624}
Lee	20,735	20,827	20,921	21,019	21,210	(4,242)	[1,018]	{509}	21,401	(4,280)	[1,027]	{514}	21,589	(4,318)	[1,036]	{518}
Madison	45,548	45,695	45,826	46,133	46,723	(9,345)	[2,243]	{1,121}	47,306	(9,461)	[2,271]	{1,135}	47,914	(9,583)	[2,300]	{1,150}
Marshall	16,232	16,291	16,338	16,531	16,752	(3,350)	[804]	{402}	16,974	(3,395)	[815]	{407}	17,204	(3,441)	[826]	{413}
Mobile	65,549	65,716	67,156	67,486	68,271	(13,654)	[3,277]	{1,638}	69,057	(13,811)	[3,315]	{1,657}	69,839	(13,968)	[3,352]	{1,676}
Montgomery	31,257	31,331	31,461	31,559	31,855	(6,371)	[1,529]	{765}	32,147	(6,429)	[1,543]	{772}	32,445	(6,489)	[1,557]	{779}
Shelby	33,355	33,473	33,642	33,849	34,263	(6,853)	[1,645]	{822}	34,692	(6,938)	[1,665]	{833}	35,123	(7,025)	[1,686]	{843}
Tuscaloosa	31,169	31,248	31,446	31,649	32,016	(6,403)	[1,537]	{768}	32,401	(6,480)	[1,555]	{778}	32,807	(6,561)	[1,575]	{787}

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.