

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

**Date: 8/23/21**

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 8/23/21 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.**

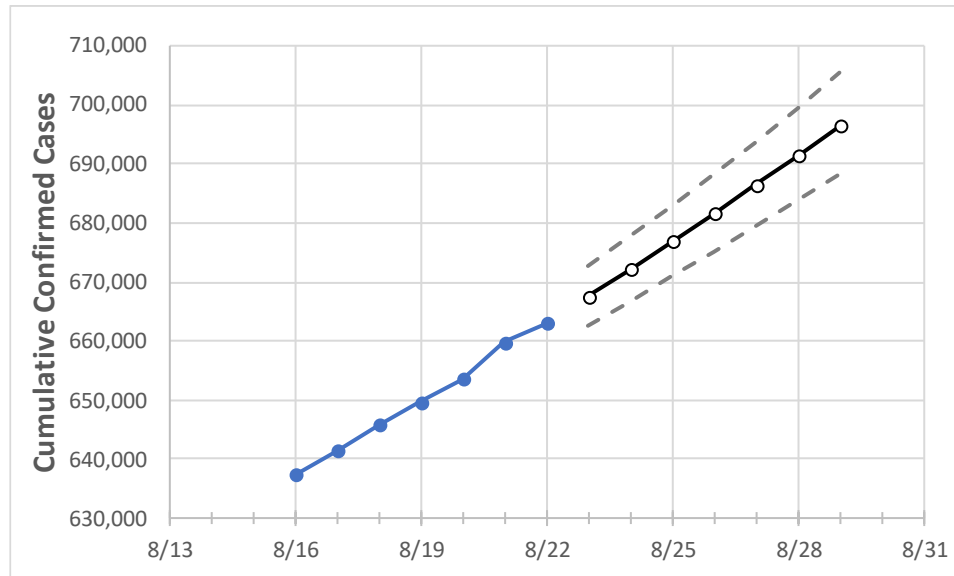
### **IEM's Modeling Lead**

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:						
	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29
Alabama	649,741	653,540	659,750	663,065	667,565	672,115	676,818	681,566	686,463	691,451	696,511

*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:						
	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29
Jefferson	93,764	94,190	95,077	95,624	96,266	96,934	97,616	98,304	99,025	99,755	100,500
Lee	18,875	18,994	19,198	19,291	19,430	19,570	19,719	19,875	20,030	20,190	20,360
Madison	40,459	40,694	40,988	41,260	41,519	41,785	42,059	42,346	42,638	42,941	43,255
Marshall	14,351	14,436	14,603	14,638	14,731	14,832	14,933	15,037	15,143	15,253	15,360
Mobile	58,624	59,002	59,597	59,976	60,472	60,971	61,465	61,959	62,454	62,950	63,455
Montgomery	28,412	28,520	28,753	28,879	29,063	29,251	29,444	29,644	29,851	30,061	30,287
Shelby	29,850	29,987	30,267	30,403	30,585	30,773	30,961	31,153	31,355	31,550	31,755
Tuscaloosa	28,778	28,885	29,020	29,099	29,205	29,315	29,426	29,537	29,653	29,768	29,887

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:											
	8/19	8/20	8/21	8/22	8/24				8/26				8/28			
Jefferson	93,764	94,190	95,077	95,624	96,934	(19,387)	[4,653]	{2,326}	98,304	(19,661)	[4,719]	{2,359}	99,755	(19,951)	[4,788]	{2,394}
Lee	18,875	18,994	19,198	19,291	19,570	(3,914)	[939]	{470}	19,875	(3,975)	[954]	{477}	20,190	(4,038)	[969]	{485}
Madison	40,459	40,694	40,988	41,260	41,785	(8,357)	[2,006]	{1,003}	42,346	(8,469)	[2,033]	{1,016}	42,941	(8,588)	[2,061]	{1,031}
Marshall	14,351	14,436	14,603	14,638	14,832	(2,966)	[712]	{356}	15,037	(3,007)	[722]	{361}	15,253	(3,051)	[732]	{366}
Mobile	58,624	59,002	59,597	59,976	60,971	(12,194)	[2,927]	{1,463}	61,959	(12,392)	[2,974]	{1,487}	62,950	(12,590)	[3,022]	{1,511}
Montgomery	28,412	28,520	28,753	28,879	29,251	(5,850)	[1,404]	{702}	29,644	(5,929)	[1,423]	{711}	30,061	(6,012)	[1,443]	{721}
Shelby	29,850	29,987	30,267	30,403	30,773	(6,155)	[1,477]	{739}	31,153	(6,231)	[1,495]	{748}	31,550	(6,310)	[1,514]	{757}
Tuscaloosa	28,778	28,885	29,020	29,099	29,315	(5,863)	[1,407]	{704}	29,537	(5,907)	[1,418]	{709}	29,768	(5,954)	[1,429]	{714}

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.