

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

**Date: 9/3/21**

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 9/3/21 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.**

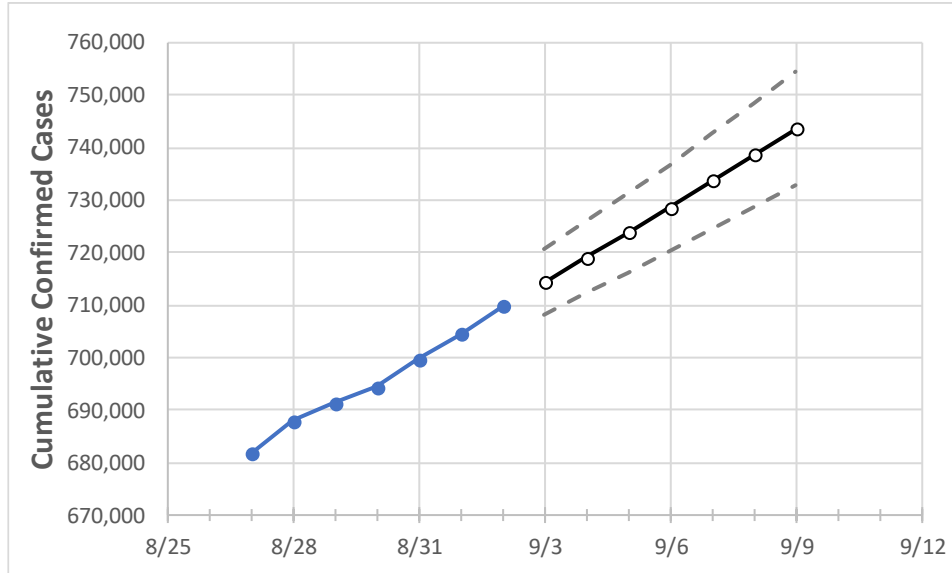
### **IEM's Modeling Lead**

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:						
	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9
Alabama	694,523	699,729	704,420	709,732	714,347	719,087	723,855	728,678	733,707	738,609	743,631

*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:						
	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9
Jefferson	100,345	101,002	101,613	102,537	103,228	103,930	104,655	105,383	106,124	106,871	107,627
Lee	20,020	20,152	20,243	20,361	20,474	20,590	20,705	20,819	20,939	21,058	21,174
Madison	43,644	43,897	44,199	44,541	44,888	45,251	45,610	45,983	46,370	46,774	47,173
Marshall	15,447	15,572	15,739	15,867	15,990	16,117	16,246	16,377	16,510	16,647	16,786
Mobile	63,157	63,554	64,054	64,421	64,796	65,180	65,545	65,903	66,276	66,645	66,997
Montgomery	30,152	30,330	30,491	30,714	30,902	31,088	31,276	31,472	31,666	31,867	32,069
Shelby	31,907	32,121	32,350	32,623	32,841	33,073	33,297	33,527	33,768	34,004	34,252
Tuscaloosa	30,023	30,178	30,360	30,607	30,760	30,919	31,086	31,253	31,426	31,608	31,783

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:											
	8/30	8/31	9/1	9/2	9/4			9/6			9/8					
Jefferson	100,345	101,002	101,613	102,537	103,930	(20,786)	[4,989]	{2,494}	105,383	(21,077)	[5,058]	{2,529}	106,871	(21,374)	[5,130]	{2,565}
Lee	20,020	20,152	20,243	20,361	20,590	(4,118)	[988]	{494}	20,819	(4,164)	[999]	{500}	21,058	(4,212)	[1,011]	{505}
Madison	43,644	43,897	44,199	44,541	45,251	(9,050)	[2,172]	{1,086}	45,983	(9,197)	[2,207]	{1,104}	46,774	(9,355)	[2,245]	{1,123}
Marshall	15,447	15,572	15,739	15,867	16,117	(3,223)	[774]	{387}	16,377	(3,275)	[786]	{393}	16,647	(3,329)	[799]	{400}
Mobile	63,157	63,554	64,054	64,421	65,180	(13,036)	[3,129]	{1,564}	65,903	(13,181)	[3,163]	{1,582}	66,645	(13,329)	[3,199]	{1,599}
Montgomery	30,152	30,330	30,491	30,714	31,088	(6,218)	[1,492]	{746}	31,472	(6,294)	[1,511]	{755}	31,867	(6,373)	[1,530]	{765}
Shelby	31,907	32,121	32,350	32,623	33,073	(6,615)	[1,587]	{794}	33,527	(6,705)	[1,609]	{805}	34,004	(6,801)	[1,632]	{816}
Tuscaloosa	30,023	30,178	30,360	30,607	30,919	(6,184)	[1,484]	{742}	31,253	(6,251)	[1,500]	{750}	31,608	(6,322)	[1,517]	{759}

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.