

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 1/10/22**

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 1/10/22 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.**

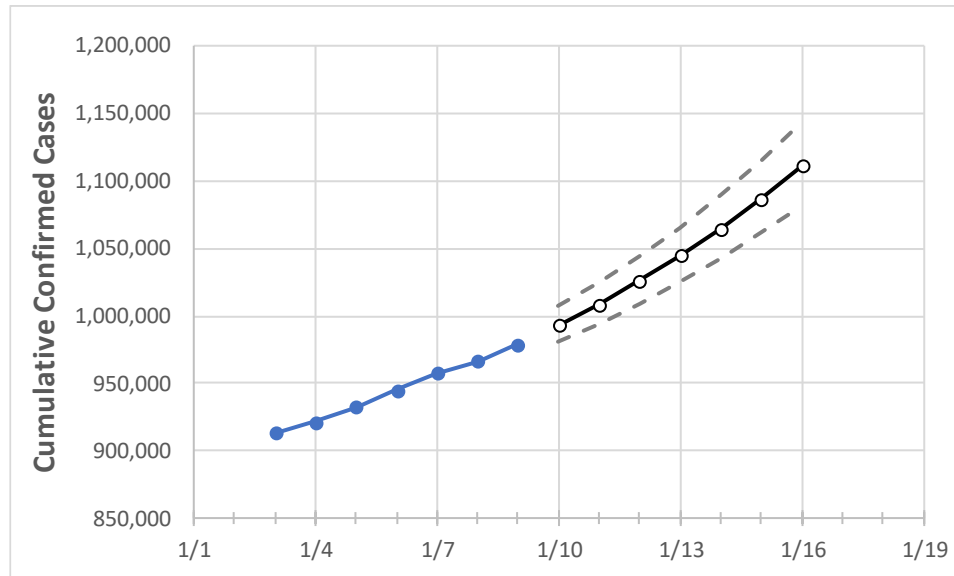
**IEM's Modeling Lead**

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:							
	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	
Alabama	944,876	957,848	966,180	978,632	993,147	1,008,864	1,025,984	1,044,594	1,064,897	1,087,080	1,110,855	

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:							
	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	
Jefferson	135,392	137,434	138,918	141,189	143,955	146,962	150,236	153,804	157,676	161,908	166,532	
Lee	28,620	28,971	29,355	29,749	30,253	30,796	31,399	32,057	32,779	33,565	34,440	
Madison	61,432	62,590	63,239	64,094	65,189	66,392	67,644	69,041	70,537	72,142	73,873	
Marshall	20,135	20,347	20,486	20,625	20,810	21,013	21,223	21,458	21,710	21,983	22,279	
Mobile	84,261	85,564	86,415	87,983	89,925	92,121	94,502	97,177	100,173	103,529	107,124	
Montgomery	41,275	42,212	42,763	43,360	44,398	45,523	46,752	48,078	49,519	51,117	52,807	
Shelby	43,602	44,077	44,475	45,064	45,733	46,451	47,237	48,069	48,984	49,967	51,027	
Tuscaloosa	39,371	40,060	40,326	40,948	41,549	42,207	42,938	43,730	44,609	45,569	46,614	

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:											
	1/6	1/7	1/8	1/9	1/11			1/13			1/15					
Jefferson	135,392	137,434	138,918	141,189	146,962	(29,392)	[7,054]	{3,527}	153,804	(30,761)	[7,383]	{3,691}	161,908	(32,382)	[7,772]	{3,886}
Lee	28,620	28,971	29,355	29,749	30,796	(6,159)	[1,478]	{739}	32,057	(6,411)	[1,539]	{769}	33,565	(6,713)	[1,611]	{806}
Madison	61,432	62,590	63,239	64,094	66,392	(13,278)	[3,187]	{1,593}	69,041	(13,808)	[3,314]	{1,657}	72,142	(14,428)	[3,463]	{1,731}
Marshall	20,135	20,347	20,486	20,625	21,013	(4,203)	[1,009]	{504}	21,458	(4,292)	[1,030]	{515}	21,983	(4,397)	[1,055]	{528}
Mobile	84,261	85,564	86,415	87,983	92,121	(18,424)	[4,422]	{2,211}	97,177	(19,435)	[4,665]	{2,332}	103,529	(20,706)	[4,969]	{2,485}
Montgomery	41,275	42,212	42,763	43,360	45,523	(9,105)	[2,185]	{1,093}	48,078	(9,616)	[2,308]	{1,154}	51,117	(10,223)	[2,454]	{1,227}
Shelby	43,602	44,077	44,475	45,064	46,451	(9,290)	[2,230]	{1,115}	48,069	(9,614)	[2,307]	{1,154}	49,967	(9,993)	[2,398]	{1,199}
Tuscaloosa	39,371	40,060	40,326	40,948	42,207	(8,441)	[2,026]	{1,013}	43,730	(8,746)	[2,099]	{1,050}	45,569	(9,114)	[2,187]	{1,094}

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.