

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 6/15/21**

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 6/15/21 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.**

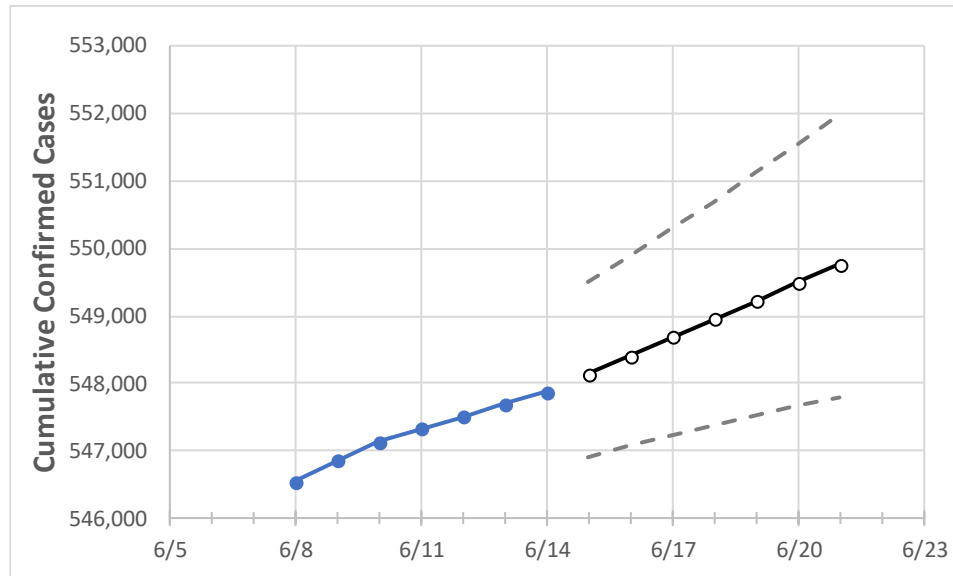
**IEM's Modeling Lead**

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:						
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21
Alabama	547,323	547,506	547,690	547,873	548,142	548,409	548,680	548,947	549,217	549,494	549,756

*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:						
	6/11	6/12	6/13	6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21
Jefferson	80,802	80,839	80,877	80,914	80,951	80,990	81,027	81,066	81,106	81,146	81,187
Lee	16,234	16,239	16,243	16,248	16,255	16,263	16,270	16,277	16,285	16,292	16,299
Madison	35,600	35,610	35,619	35,629	35,648	35,668	35,688	35,708	35,728	35,748	35,769
Marshall	12,443	12,444	12,445	12,446	12,452	12,459	12,465	12,472	12,479	12,485	12,492
Mobile	41,925	41,945	41,964	41,984	42,010	42,036	42,062	42,087	42,114	42,139	42,165
Montgomery	25,067	25,070	25,072	25,075	25,082	25,088	25,095	25,101	25,107	25,114	25,120
Shelby	25,561	25,567	25,574	25,580	25,590	25,601	25,611	25,622	25,632	25,643	25,653
Tuscaloosa	26,136	26,140	26,143	26,147	26,153	26,158	26,164	26,169	26,174	26,180	26,185

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:											
	6/11	6/12	6/13	6/14	6/16				6/18				6/20			
Jefferson	80,802	80,839	80,877	80,914	80,990	(16,198)	[3,888]	{1,944}	81,066	(16,213)	[3,891]	{1,946}	81,146	(16,229)	[3,895]	{1,948}
Lee	16,234	16,239	16,243	16,248	16,263	(3,253)	[781]	{390}	16,277	(3,255)	[781]	{391}	16,292	(3,258)	[782]	{391}
Madison	35,600	35,610	35,619	35,629	35,668	(7,134)	[1,712]	{856}	35,708	(7,142)	[1,714]	{857}	35,748	(7,150)	[1,716]	{858}
Marshall	12,443	12,444	12,445	12,446	12,459	(2,492)	[598]	{299}	12,472	(2,494)	[599]	{299}	12,485	(2,497)	[599]	{300}
Mobile	41,925	41,945	41,964	41,984	42,036	(8,407)	[2,018]	{1,009}	42,087	(8,417)	[2,020]	{1,010}	42,139	(8,428)	[2,023]	{1,011}
Montgomery	25,067	25,070	25,072	25,075	25,088	(5,018)	[1,204]	{602}	25,101	(5,020)	[1,205]	{602}	25,114	(5,023)	[1,205]	{603}
Shelby	25,561	25,567	25,574	25,580	25,601	(5,120)	[1,229]	{614}	25,622	(5,124)	[1,230]	{615}	25,643	(5,129)	[1,231]	{615}
Tuscaloosa	26,136	26,140	26,143	26,147	26,158	(5,232)	[1,256]	{628}	26,169	(5,234)	[1,256]	{628}	26,180	(5,236)	[1,257]	{628}

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.