

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 12/8/21**

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 12/8/21 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.**

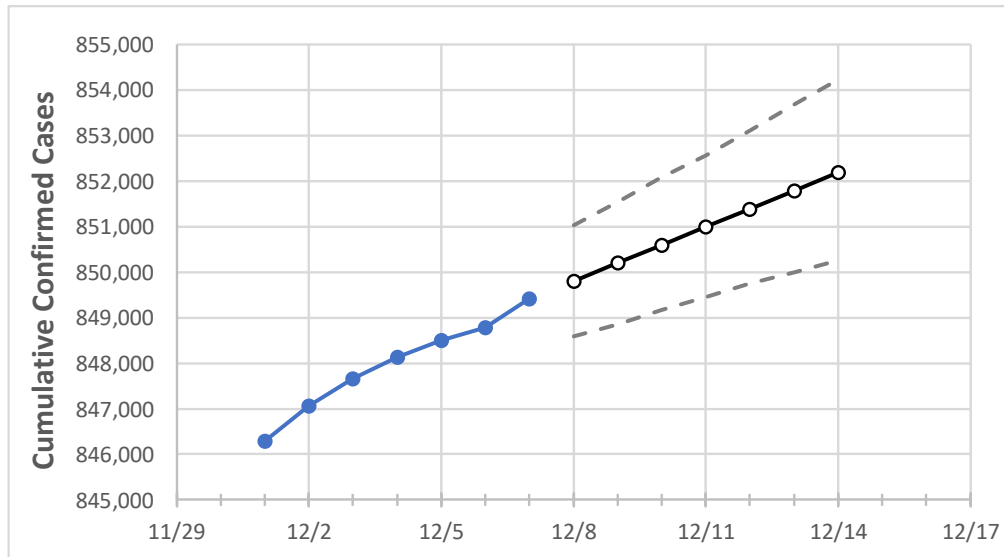
**IEM's Modeling Lead**

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:						
	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
Alabama	848,137	848,498	848,779	849,409	849,809	850,207	850,590	850,998	851,386	851,792	852,187

*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:						
	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
Jefferson	116,405	116,429	116,458	116,504	116,540	116,576	116,611	116,647	116,684	116,723	116,761
Lee	25,655	25,677	25,690	25,712	25,732	25,754	25,776	25,799	25,822	25,847	25,873
Madison	53,497	53,544	53,563	53,605	53,635	53,665	53,695	53,725	53,757	53,789	53,819
Marshall	18,846	18,859	18,865	18,878	18,889	18,901	18,913	18,924	18,937	18,950	18,963
Mobile	74,368	74,396	74,460	74,495	74,521	74,545	74,569	74,593	74,620	74,642	74,668
Montgomery	34,562	34,570	34,573	34,599	34,611	34,623	34,635	34,647	34,659	34,672	34,685
Shelby	38,435	38,446	38,454	38,474	38,486	38,498	38,510	38,522	38,533	38,545	38,556
Tuscaloosa	36,152	36,168	36,172	36,225	36,244	36,264	36,283	36,302	36,321	36,341	36,360

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:											
	12/4	12/5	12/6	12/7	12/9			12/11			12/13					
Jefferson	116,405	116,429	116,458	116,504	116,576	(23,315)	[5,596]	{2,798}	116,647	(23,329)	[5,599]	{2,800}	116,723	(23,345)	[5,603]	{2,801}
Lee	25,655	25,677	25,690	25,712	25,754	(5,151)	[1,236]	{618}	25,799	(5,160)	[1,238]	{619}	25,847	(5,169)	[1,241]	{620}
Madison	53,497	53,544	53,563	53,605	53,665	(10,733)	[2,576]	{1,288}	53,725	(10,745)	[2,579]	{1,289}	53,789	(10,758)	[2,582]	{1,291}
Marshall	18,846	18,859	18,865	18,878	18,901	(3,780)	[907]	{454}	18,924	(3,785)	[908]	{454}	18,950	(3,790)	[910]	{455}
Mobile	74,368	74,396	74,460	74,495	74,545	(14,909)	[3,578]	{1,789}	74,593	(14,919)	[3,580]	{1,790}	74,642	(14,928)	[3,583]	{1,791}
Montgomery	34,562	34,570	34,573	34,599	34,623	(6,925)	[1,662]	{831}	34,647	(6,929)	[1,663]	{832}	34,672	(6,934)	[1,664]	{832}
Shelby	38,435	38,446	38,454	38,474	38,498	(7,700)	[1,848]	{924}	38,522	(7,704)	[1,849]	{925}	38,545	(7,709)	[1,850]	{925}
Tuscaloosa	36,152	36,168	36,172	36,225	36,264	(7,253)	[1,741]	{870}	36,302	(7,260)	[1,742]	{871}	36,341	(7,268)	[1,744]	{872}

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.