

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 12/1/21**

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 12/1/21 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.**

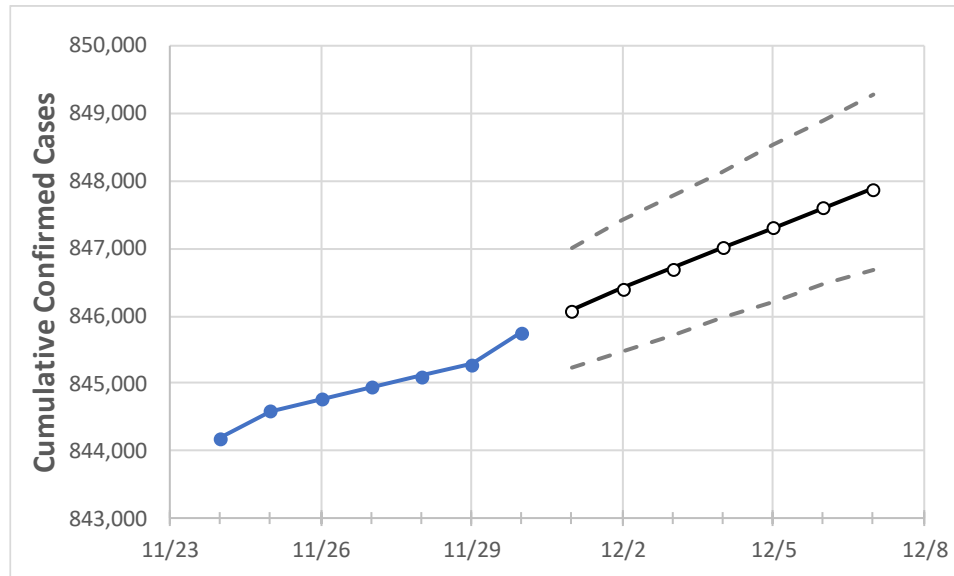
**IEM's Modeling Lead**

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:						
	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7
Alabama	844,951	845,108	845,284	845,761	846,089	846,400	846,703	847,015	847,304	847,607	847,889

*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:						
	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6	12/7
Jefferson	116,100	116,124	116,155	116,186	116,207	116,227	116,248	116,268	116,290	116,309	116,328
Lee	25,550	25,557	25,562	25,590	25,601	25,611	25,620	25,630	25,640	25,651	25,661
Madison	53,279	53,291	53,307	53,315	53,333	53,352	53,371	53,388	53,405	53,424	53,441
Marshall	18,777	18,781	18,782	18,790	18,794	18,798	18,801	18,805	18,809	18,812	18,816
Mobile	74,187	74,196	74,211	74,241	74,265	74,292	74,317	74,339	74,364	74,387	74,409
Montgomery	34,482	34,483	34,492	34,492	34,499	34,505	34,512	34,518	34,524	34,531	34,537
Shelby	38,325	38,328	38,338	38,351	38,366	38,380	38,393	38,407	38,420	38,434	38,446
Tuscaloosa	36,009	36,017	36,022	36,052	36,072	36,090	36,109	36,127	36,146	36,165	36,183

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:											
	11/27	11/28	11/29	11/30	12/2			12/4			12/6					
Jefferson	116,100	116,124	116,155	116,186	116,227	(23,245)	{5,579}	{2,789}	116,268	(23,254)	{5,581}	{2,790}	116,309	(23,262)	{5,583}	{2,791}
Lee	25,550	25,557	25,562	25,590	25,611	(5,122)	{1,229}	{615}	25,630	(5,126)	{1,230}	{615}	25,651	(5,130)	{1,231}	{616}
Madison	53,279	53,291	53,307	53,315	53,352	(10,670)	{2,561}	{1,280}	53,388	(10,678)	{2,563}	{1,281}	53,424	(10,685)	{2,564}	{1,282}
Marshall	18,777	18,781	18,782	18,790	18,798	(3,760)	{902}	{451}	18,805	(3,761)	{903}	{451}	18,812	(3,762)	{903}	{451}
Mobile	74,187	74,196	74,211	74,241	74,292	(14,858)	{3,566}	{1,783}	74,339	(14,868)	{3,568}	{1,784}	74,387	(14,877)	{3,571}	{1,785}
Montgomery	34,482	34,483	34,492	34,492	34,505	(6,901)	{1,656}	{828}	34,518	(6,904)	{1,657}	{828}	34,531	(6,906)	{1,657}	{829}
Shelby	38,325	38,328	38,338	38,351	38,380	(7,676)	{1,842}	{921}	38,407	(7,681)	{1,844}	{922}	38,434	(7,687)	{1,845}	{922}
Tuscaloosa	36,009	36,017	36,022	36,052	36,090	(7,218)	{1,732}	{866}	36,127	(7,225)	{1,734}	{867}	36,165	(7,233)	{1,736}	{868}

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.