

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 9/29/21**

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 9/29/21 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.**

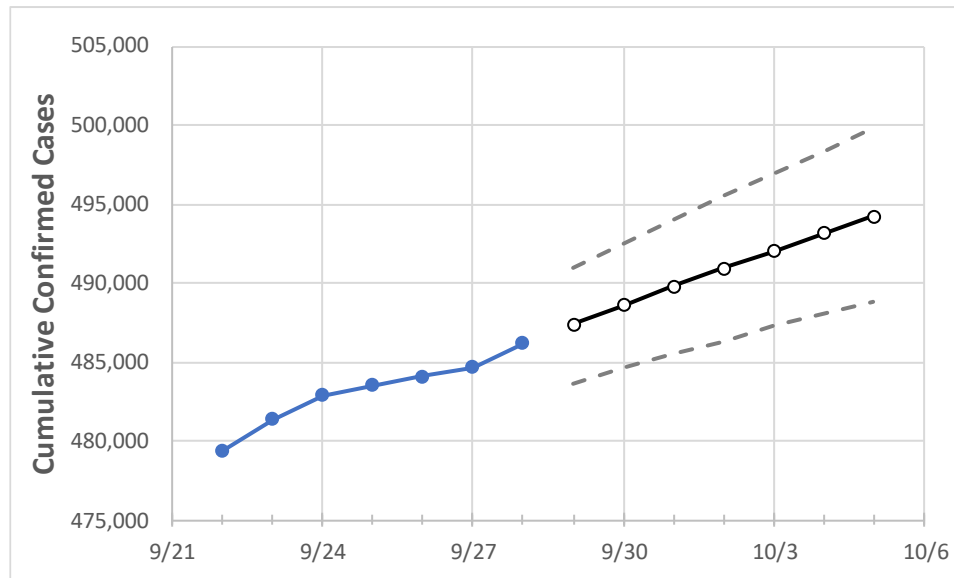
**IEM's Modeling Lead**

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.

## Mississippi State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5
Mississippi	483,493	484,084	484,675	486,195	487,397	488,573	489,766	490,918	492,025	493,163	494,248

*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.*

## Mississippi Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5
DeSoto	30,674	30,739	30,803	30,890	30,991	31,085	31,181	31,276	31,365	31,463	31,553
Harrison	33,092	33,122	33,151	33,248	33,341	33,430	33,511	33,599	33,678	33,760	33,846
Hinds	31,075	31,130	31,184	31,307	31,362	31,414	31,466	31,518	31,573	31,624	31,673
Jackson	23,703	23,719	23,735	23,817	23,880	23,937	23,996	24,053	24,106	24,169	24,220
Lauderdale	11,608	11,616	11,623	11,647	11,674	11,699	11,724	11,750	11,777	11,801	11,824
Madison	14,179	14,193	14,206	14,297	14,320	14,341	14,359	14,378	14,396	14,416	14,434
Rankin	21,357	21,373	21,390	21,498	21,525	21,557	21,584	21,613	21,640	21,668	21,691

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.

### Mississippi Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	9/25	9/26	9/27	9/28	9/30				10/2				10/4			
DeSoto	30,674	30,739	30,803	30,890	31,085	(6,217)	[1,492]	{746}	31,276	(6,255)	[1,501]	{751}	31,463	(6,293)	[1,510]	{755}
Harrison	33,092	33,122	33,151	33,248	33,430	(6,686)	[1,605]	{802}	33,599	(6,720)	[1,613]	{806}	33,760	(6,752)	[1,620]	{810}
Hinds	31,075	31,130	31,184	31,307	31,414	(6,283)	[1,508]	{754}	31,518	(6,304)	[1,513]	{756}	31,624	(6,325)	[1,518]	{759}
Jackson	23,703	23,719	23,735	23,817	23,937	(4,787)	[1,149]	{574}	24,053	(4,811)	[1,155]	{577}	24,169	(4,834)	[1,160]	{580}
Lauderdale	11,608	11,616	11,623	11,647	11,699	(2,340)	[562]	{281}	11,750	(2,350)	[564]	{282}	11,801	(2,360)	[566]	{283}
Madison	14,179	14,193	14,206	14,297	14,341	(2,868)	[688]	{344}	14,378	(2,876)	[690]	{345}	14,416	(2,883)	[692]	{346}
Rankin	21,357	21,373	21,390	21,498	21,557	(4,311)	[1,035]	{517}	21,613	(4,323)	[1,037]	{519}	21,668	(4,334)	[1,040]	{520}

For additional information from IEM, please contact Jon Mabry, Vice President of Disaster Recovery at 601-953-4562 or [jon.mabry@iem.com](mailto:jon.mabry@iem.com) or Bryan Koon, Vice President of Emergency Management and Homeland Security at [bryan.koon@iem.com](mailto:bryan.koon@iem.com) or 850-519-7966.