

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 8/27/21**

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 8/27/21 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.**

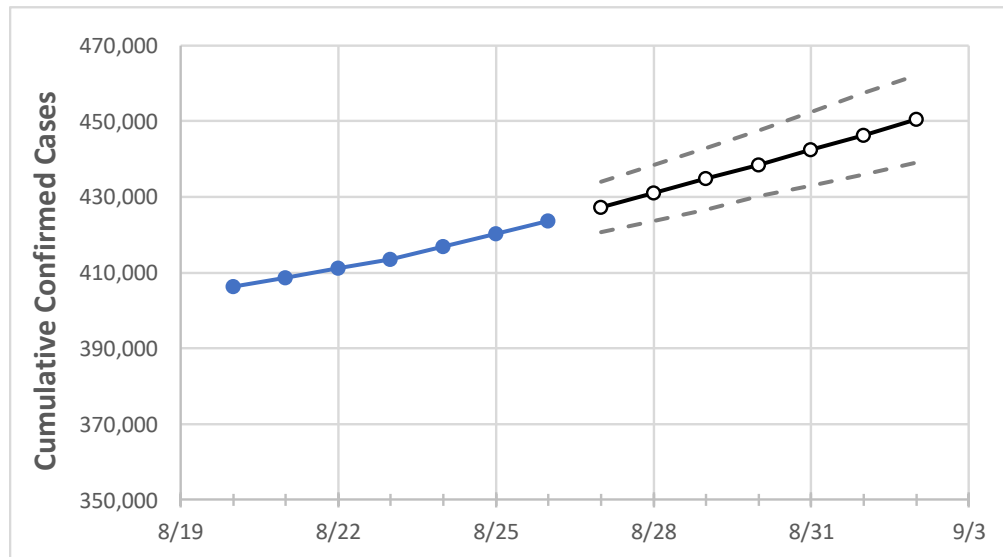
**IEM's Modeling Lead**

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:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
Mississippi	413,498	416,789	420,174	423,599	427,284	431,003	434,771	438,542	442,389	446,273	450,391

*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:						
	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1	9/2
DeSoto	26,087	26,204	26,328	26,540	26,720	26,893	27,079	27,260	27,455	27,647	27,850
Harrison	27,625	27,814	28,104	28,472	28,804	29,148	29,475	29,818	30,161	30,513	30,853
Hinds	27,729	27,843	28,101	28,293	28,461	28,631	28,804	28,974	29,153	29,323	29,496
Jackson	19,808	20,049	20,209	20,440	20,642	20,844	21,044	21,246	21,448	21,654	21,858
Lauderdale	10,012	10,116	10,219	10,278	10,362	10,444	10,526	10,614	10,699	10,780	10,857
Madison	12,619	12,659	12,793	12,887	12,988	13,084	13,187	13,291	13,400	13,511	13,618
Rankin	18,703	18,835	19,126	19,269	19,470	19,685	19,896	20,113	20,324	20,570	20,810

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:											
	8/23	8/24	8/25	8/26	8/28				8/30				9/1			
DeSoto	26,087	26,204	26,328	26,540	26,893	(5,379)	[1,291]	{645}	27,260	(5,452)	[1,308]	{654}	27,647	(5,529)	[1,327]	{664}
Harrison	27,625	27,814	28,104	28,472	29,148	(5,830)	[1,399]	{700}	29,818	(5,964)	[1,431]	{716}	30,513	(6,103)	[1,465]	{732}
Hinds	27,729	27,843	28,101	28,293	28,631	(5,726)	[1,374]	{687}	28,974	(5,795)	[1,391]	{695}	29,323	(5,865)	[1,408]	{704}
Jackson	19,808	20,049	20,209	20,440	20,844	(4,169)	[1,000]	{500}	21,246	(4,249)	[1,020]	{510}	21,654	(4,331)	[1,039]	{520}
Lauderdale	10,012	10,116	10,219	10,278	10,444	(2,089)	[501]	{251}	10,614	(2,123)	[509]	{255}	10,780	(2,156)	[517]	{259}
Madison	12,619	12,659	12,793	12,887	13,084	(2,617)	[628]	{314}	13,291	(2,658)	[638]	{319}	13,511	(2,702)	[649]	{324}
Rankin	18,703	18,835	19,126	19,269	19,685	(3,937)	[945]	{472}	20,113	(4,023)	[965]	{483}	20,570	(4,114)	[987]	{494}

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.