

## IEM's AI Modeling: Short-term COVID-19 Projections

Date: 10/1/21

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 10/1/21 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.**

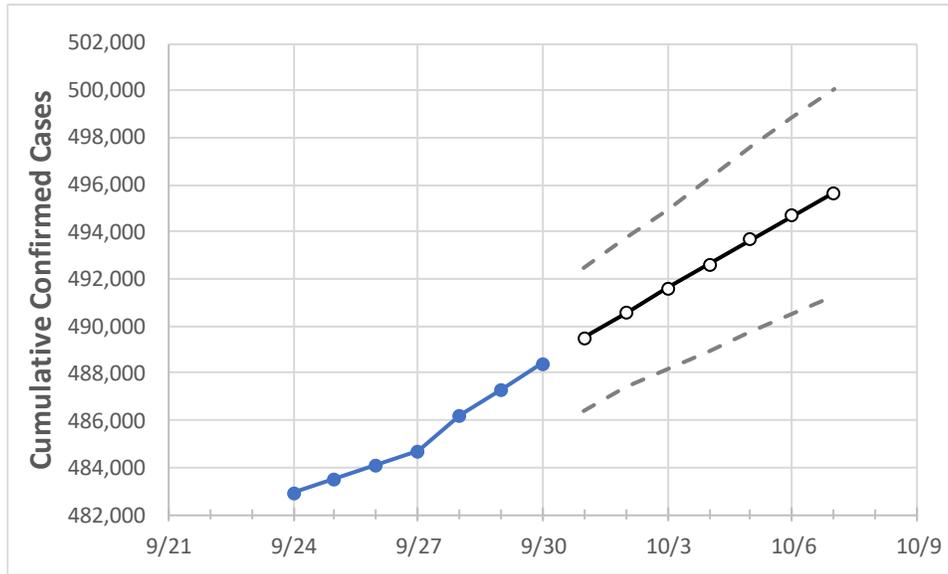
### IEM's Modeling Lead

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.

### Mississippi State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5	10/6	10/7
Mississippi	484,675	486,195	487,293	488,394	489,491	490,543	491,618	492,627	493,675	494,671	495,671

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:						
	9/27	9/28	9/29	9/30	10/1	10/2	10/3	10/4	10/5	10/6	10/7
DeSoto	30,803	30,890	30,954	31,035	31,120	31,208	31,292	31,380	31,465	31,545	31,629
Harrison	33,151	33,248	33,418	33,492	33,576	33,658	33,735	33,813	33,889	33,971	34,042
Hinds	31,184	31,307	31,347	31,430	31,484	31,537	31,592	31,644	31,697	31,750	31,803
Jackson	23,735	23,817	23,877	23,908	23,958	24,005	24,053	24,096	24,144	24,189	24,230
Lauderdale	11,623	11,647	11,680	11,715	11,741	11,765	11,790	11,814	11,837	11,868	11,889
Madison	14,206	14,297	14,314	14,345	14,367	14,386	14,406	14,425	14,443	14,464	14,482
Rankin	21,390	21,498	21,520	21,610	21,642	21,674	21,707	21,736	21,769	21,799	21,830

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:											
	9/27	9/28	9/29	9/30	10/2				10/4				10/6			
DeSoto	30,803	30,890	30,954	31,035	31,208	(6,242)	[1,498]	{749}	31,380	(6,276)	[1,506]	{753}	31,545	(6,309)	[1,514]	{757}
Harrison	33,151	33,248	33,418	33,492	33,658	(6,732)	[1,616]	{808}	33,813	(6,763)	[1,623]	{812}	33,971	(6,794)	[1,631]	{815}
Hinds	31,184	31,307	31,347	31,430	31,537	(6,307)	[1,514]	{757}	31,644	(6,329)	[1,519]	{759}	31,750	(6,350)	[1,524]	{762}
Jackson	23,735	23,817	23,877	23,908	24,005	(4,801)	[1,152]	{576}	24,096	(4,819)	[1,157]	{578}	24,189	(4,838)	[1,161]	{581}
Lauderdale	11,623	11,647	11,680	11,715	11,765	(2,353)	[565]	{282}	11,814	(2,363)	[567]	{284}	11,868	(2,374)	[570]	{285}
Madison	14,206	14,297	14,314	14,345	14,386	(2,877)	[691]	{345}	14,425	(2,885)	[692]	{346}	14,464	(2,893)	[694]	{347}
Rankin	21,390	21,498	21,520	21,610	21,674	(4,335)	[1,040]	{520}	21,736	(4,347)	[1,043]	{522}	21,799	(4,360)	[1,046]	{523}

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.