

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

**Date: 3/4/22**

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 3/4/22 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.**

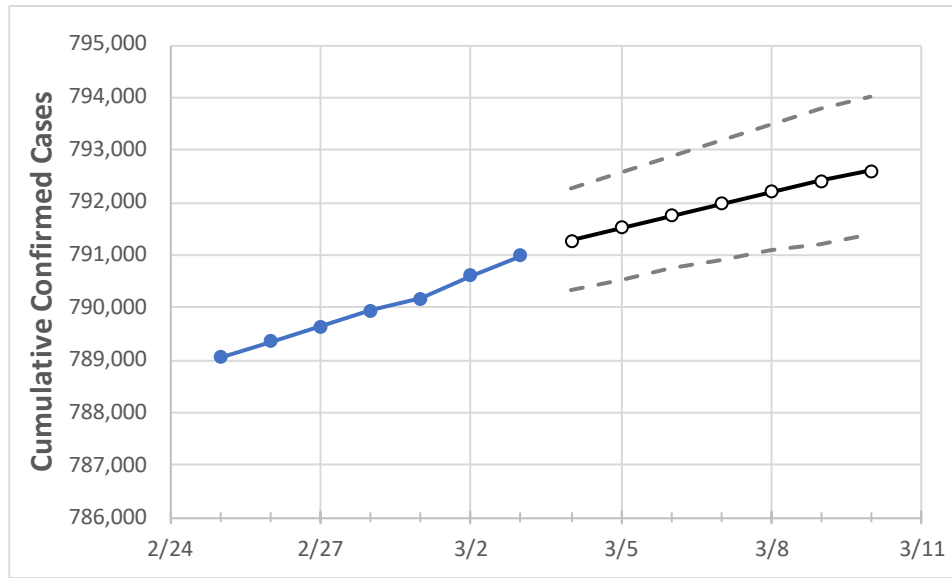
### **IEM's Modeling Lead**

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:						
	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	3/10
Mississippi	789,940	790,168	790,616	790,986	791,266	791,519	791,753	791,983	792,200	792,409	792,595

*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:						
	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9	3/10
DeSoto	49,826	49,837	49,851	49,872	49,888	49,904	49,917	49,930	49,943	49,956	49,967
Harrison	53,152	53,183	53,224	53,248	53,269	53,288	53,307	53,324	53,341	53,358	53,372
Hinds	51,884	51,897	51,904	51,928	51,941	51,955	51,965	51,979	51,989	52,000	52,009
Jackson	36,714	36,723	36,735	36,738	36,747	36,754	36,762	36,768	36,775	36,781	36,786
Lauderdale	18,695	18,696	18,704	18,709	18,716	18,722	18,728	18,734	18,739	18,745	18,749
Madison	23,857	23,869	23,873	23,877	23,886	23,893	23,899	23,906	23,911	23,919	23,925
Rankin	36,303	36,319	36,327	36,340	36,353	36,367	36,378	36,389	36,400	36,411	36,421

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:											
	2/28	3/1	3/2	3/3	3/5				3/7				3/9			
DeSoto	49,826	49,837	49,851	49,872	49,904	(9,981)	[2,395]	{1,198}	49,930	(9,986)	[2,397]	{1,198}	49,956	(9,991)	[2,398]	{1,199}
Harrison	53,152	53,183	53,224	53,248	53,288	(10,658)	[2,558]	{1,279}	53,324	(10,665)	[2,560]	{1,280}	53,358	(10,672)	[2,561]	{1,281}
Hinds	51,884	51,897	51,904	51,928	51,955	(10,391)	[2,494]	{1,247}	51,979	(10,396)	[2,495]	{1,247}	52,000	(10,400)	[2,496]	{1,248}
Jackson	36,714	36,723	36,735	36,738	36,754	(7,351)	[1,764]	{882}	36,768	(7,354)	[1,765]	{882}	36,781	(7,356)	[1,765]	{883}
Lauderdale	18,695	18,696	18,704	18,709	18,722	(3,744)	[899]	{449}	18,734	(3,747)	[899]	{450}	18,745	(3,749)	[900]	{450}
Madison	23,857	23,869	23,873	23,877	23,893	(4,779)	[1,147]	{573}	23,906	(4,781)	[1,147]	{574}	23,919	(4,784)	[1,148]	{574}
Rankin	36,303	36,319	36,327	36,340	36,367	(7,273)	[1,746]	{873}	36,389	(7,278)	[1,747]	{873}	36,411	(7,282)	[1,748]	{874}

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.