

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

**Date: 7/23/21**

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 7/23/21 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.**

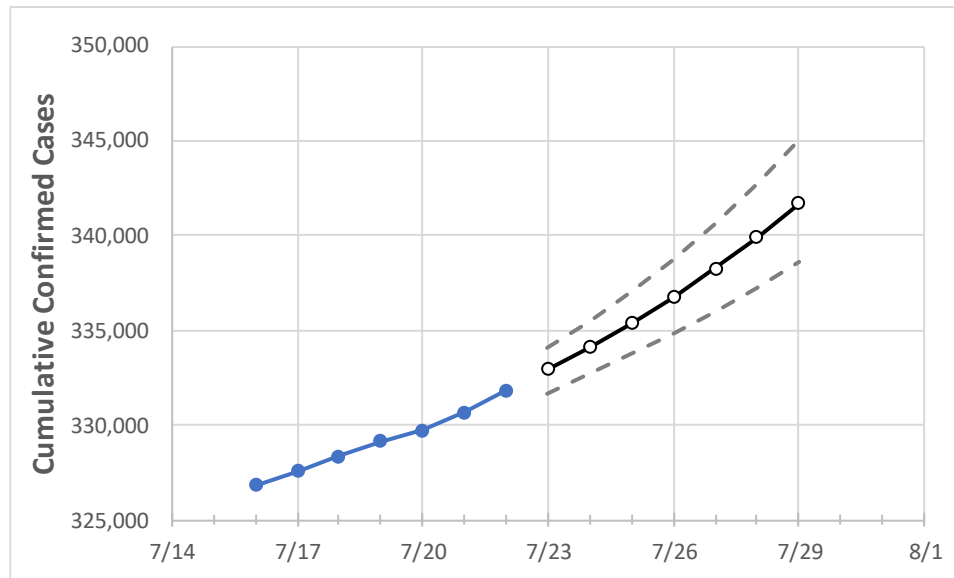
### **IEM's Modeling Lead**

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:						
	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29
Mississippi	329,130	329,703	330,664	331,863	332,929	334,090	335,363	336,762	338,277	339,912	341,728

*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:						
	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29
DeSoto	22,732	22,766	22,803	22,855	22,903	22,954	23,010	23,071	23,137	23,209	23,288
Harrison	19,221	19,268	19,332	19,462	19,563	19,673	19,791	19,922	20,065	20,220	20,396
Hinds	22,322	22,385	22,483	22,625	22,774	22,932	23,100	23,280	23,473	23,677	23,897
Jackson	14,077	14,098	14,166	14,233	14,286	14,345	14,412	14,486	14,567	14,658	14,757
Lauderdale	7,432	7,445	7,485	7,528	7,576	7,633	7,699	7,777	7,868	7,975	8,101
Madison	10,576	10,589	10,616	10,658	10,690	10,724	10,761	10,800	10,843	10,888	10,936
Rankin	14,598	14,631	14,688	14,765	14,833	14,906	14,984	15,068	15,158	15,256	15,360

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:											
	7/19	7/20	7/21	7/22	7/24				7/26				7/28			
DeSoto	22,732	22,766	22,803	22,855	22,954	(4,591)	[1,102]	{551}	23,071	(4,614)	[1,107]	{554}	23,209	(4,642)	[1,114]	{557}
Harrison	19,221	19,268	19,332	19,462	19,673	(3,935)	[944]	{472}	19,922	(3,984)	[956]	{478}	20,220	(4,044)	[971]	{485}
Hinds	22,322	22,385	22,483	22,625	22,932	(4,586)	[1,101]	{550}	23,280	(4,656)	[1,117]	{559}	23,677	(4,735)	[1,137]	{568}
Jackson	14,077	14,098	14,166	14,233	14,345	(2,869)	[689]	{344}	14,486	(2,897)	[695]	{348}	14,658	(2,932)	[704]	{352}
Lauderdale	7,432	7,445	7,485	7,528	7,633	(1,527)	[366]	{183}	7,777	(1,555)	[373]	{187}	7,975	(1,595)	[383]	{191}
Madison	10,576	10,589	10,616	10,658	10,724	(2,145)	[515]	{257}	10,800	(2,160)	[518]	{259}	10,888	(2,178)	[523]	{261}
Rankin	14,598	14,631	14,688	14,765	14,906	(2,981)	[715]	{358}	15,068	(3,014)	[723]	{362}	15,256	(3,051)	[732]	{366}

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.