

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

**Date: 8/4/21**

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 8/4/21 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.**

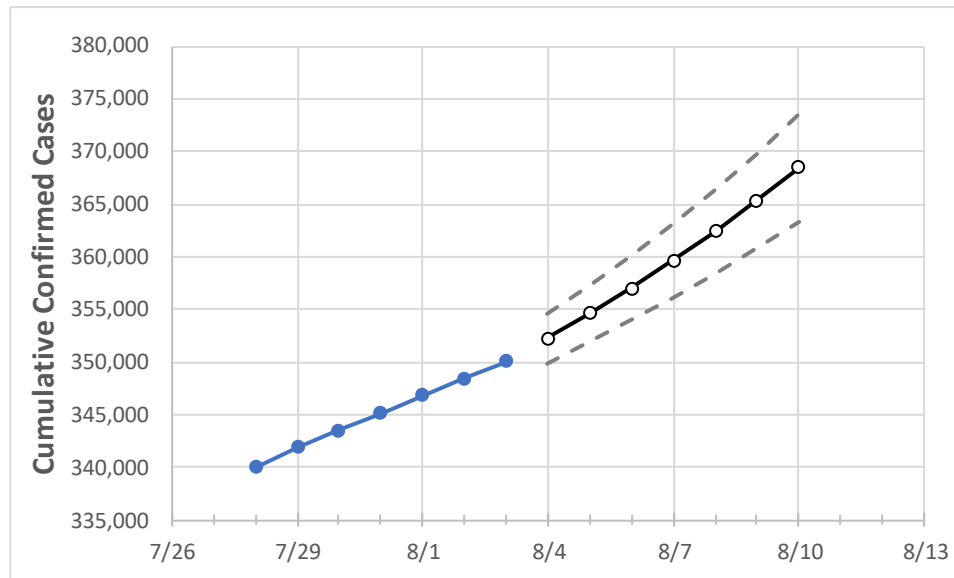
### **IEM's Modeling Lead**

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:						
	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10
Mississippi	345,169	346,832	348,496	350,070	352,266	354,589	357,026	359,643	362,420	365,349	368,480

*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:						
	7/31	8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10
DeSoto	23,299	23,369	23,439	23,513	23,594	23,681	23,772	23,869	23,971	24,081	24,198
Harrison	20,707	20,886	21,066	21,172	21,383	21,605	21,843	22,096	22,367	22,653	22,960
Hinds	24,097	24,262	24,427	24,512	24,693	24,880	25,073	25,271	25,471	25,676	25,884
Jackson	15,354	15,475	15,597	15,735	15,942	16,171	16,422	16,698	17,000	17,337	17,705
Lauderdale	7,925	7,967	8,008	8,087	8,168	8,255	8,354	8,459	8,574	8,703	8,843
Madison	11,011	11,062	11,114	11,171	11,235	11,305	11,378	11,456	11,539	11,627	11,719
Rankin	15,509	15,606	15,704	15,798	15,918	16,045	16,179	16,320	16,469	16,625	16,790

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:											
	7/31	8/1	8/2	8/3	8/5				8/7				8/9			
DeSoto	23,299	23,369	23,439	23,513	23,681	(4,736)	[1,137]	{568}	23,869	(4,774)	[1,146]	{573}	24,081	(4,816)	[1,156]	{578}
Harrison	20,707	20,886	21,066	21,172	21,605	(4,321)	[1,037]	{519}	22,096	(4,419)	[1,061]	{530}	22,653	(4,531)	[1,087]	{544}
Hinds	24,097	24,262	24,427	24,512	24,880	(4,976)	[1,194]	{597}	25,271	(5,054)	[1,213]	{607}	25,676	(5,135)	[1,232]	{616}
Jackson	15,354	15,475	15,597	15,735	16,171	(3,234)	[776]	{388}	16,698	(3,340)	[802]	{401}	17,337	(3,467)	[832]	{416}
Lauderdale	7,925	7,967	8,008	8,087	8,255	(1,651)	[396]	{198}	8,459	(1,692)	[406]	{203}	8,703	(1,741)	[418]	{209}
Madison	11,011	11,062	11,114	11,171	11,305	(2,261)	[543]	{271}	11,456	(2,291)	[550]	{275}	11,627	(2,325)	[558]	{279}
Rankin	15,509	15,606	15,704	15,798	16,045	(3,209)	[770]	{385}	16,320	(3,264)	[783]	{392}	16,625	(3,325)	[798]	{399}

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.