

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

**Date: 3/8/22**

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 3/8/22 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.**

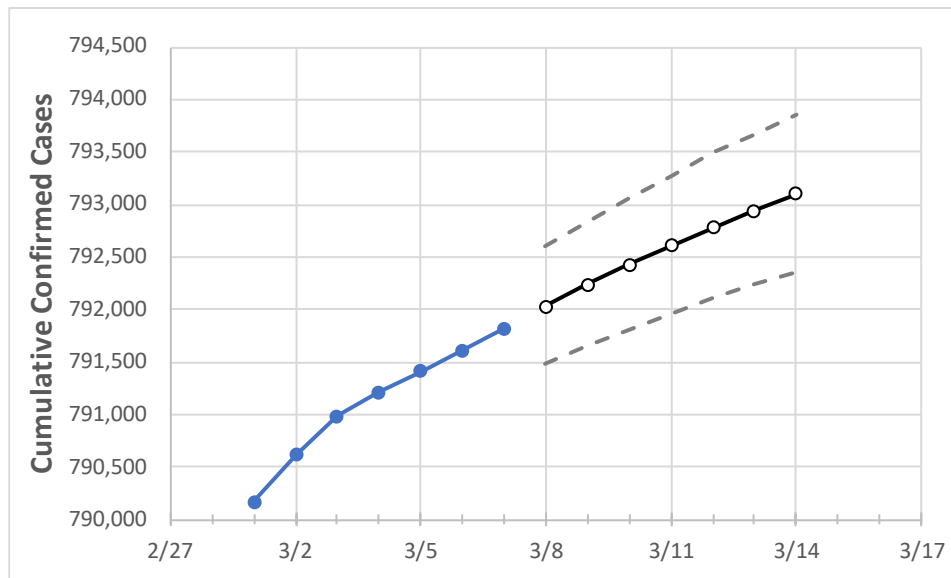
### **IEM's Modeling Lead**

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:						
	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14
Mississippi	791,208	791,411	791,614	791,817	792,032	792,234	792,426	792,604	792,782	792,942	793,106

*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:						
	3/4	3/5	3/6	3/7	3/8	3/9	3/10	3/11	3/12	3/13	3/14
DeSoto	49,887	49,894	49,902	49,909	49,921	49,932	49,943	49,954	49,963	49,972	49,981
Harrison	53,265	53,286	53,307	53,328	53,345	53,362	53,378	53,393	53,407	53,421	53,434
Hinds	51,938	51,951	51,963	51,976	51,987	51,997	52,006	52,016	52,024	52,033	52,041
Jackson	36,743	36,747	36,752	36,756	36,762	36,767	36,772	36,776	36,781	36,785	36,788
Lauderdale	18,712	18,714	18,715	18,717	18,721	18,726	18,730	18,733	18,736	18,740	18,743
Madison	23,880	23,888	23,897	23,905	23,911	23,916	23,920	23,925	23,930	23,934	23,938
Rankin	36,343	36,355	36,367	36,379	36,388	36,395	36,403	36,410	36,416	36,423	36,429

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:											
	3/4	3/5	3/6	3/7	3/9				3/11				3/13			
DeSoto	49,887	49,894	49,902	49,909	49,932	(9,986)	[2,397]	{1,198}	49,954	(9,991)	[2,398]	{1,199}	49,972	(9,994)	[2,399]	{1,199}
Harrison	53,265	53,286	53,307	53,328	53,362	(10,672)	[2,561]	{1,281}	53,393	(10,679)	[2,563]	{1,281}	53,421	(10,684)	[2,564]	{1,282}
Hinds	51,938	51,951	51,963	51,976	51,997	(10,399)	[2,496]	{1,248}	52,016	(10,403)	[2,497]	{1,248}	52,033	(10,407)	[2,498]	{1,249}
Jackson	36,743	36,747	36,752	36,756	36,767	(7,353)	[1,765]	{882}	36,776	(7,355)	[1,765]	{883}	36,785	(7,357)	[1,766]	{883}
Lauderdale	18,712	18,714	18,715	18,717	18,726	(3,745)	[899]	{449}	18,733	(3,747)	[899]	{450}	18,740	(3,748)	[900]	{450}
Madison	23,880	23,888	23,897	23,905	23,916	(4,783)	[1,148]	{574}	23,925	(4,785)	[1,148]	{574}	23,934	(4,787)	[1,149]	{574}
Rankin	36,343	36,355	36,367	36,379	36,395	(7,279)	[1,747]	{873}	36,410	(7,282)	[1,748]	{874}	36,423	(7,285)	[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.