

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

**Date: 2/14/22**

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 2/14/22 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.**

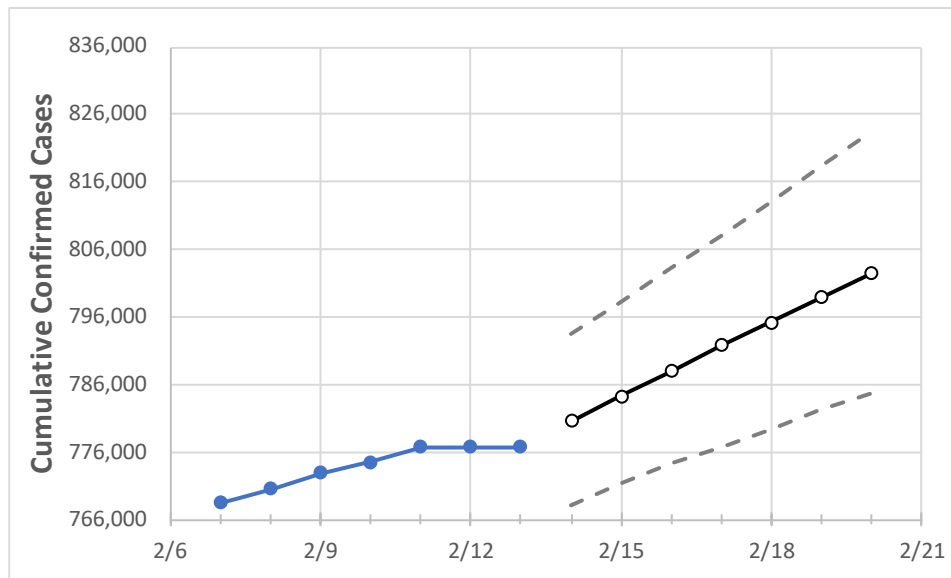
### **IEM's Modeling Lead**

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:						
	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20
Mississippi	774,505	776,717	776,717	776,717	780,542	784,335	787,992	791,763	795,248	798,917	802,503

*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:						
	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20
DeSoto	48,821	48,924	48,924	48,924	49,128	49,315	49,501	49,679	49,864	50,041	50,218
Harrison	51,829	52,000	52,000	52,000	52,442	52,853	53,294	53,709	54,169	54,616	55,048
Hinds	51,219	51,378	51,378	51,378	51,500	51,604	51,713	51,818	51,919	52,017	52,111
Jackson	36,182	36,225	36,225	36,225	36,383	36,525	36,673	36,812	36,955	37,093	37,232
Lauderdale	18,244	18,289	18,289	18,289	18,343	18,401	18,450	18,502	18,552	18,602	18,648
Madison	23,381	23,494	23,494	23,494	23,578	23,661	23,755	23,834	23,918	23,995	24,070
Rankin	35,556	35,740	35,740	35,740	35,921	36,089	36,250	36,420	36,586	36,727	36,895

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:											
	2/10	2/11	2/12	2/13	2/15				2/17				2/19			
DeSoto	48,821	48,924	48,924	48,924	49,315	(9,863)	[2,367]	{1,184}	49,679	(9,936)	[2,385]	{1,192}	50,041	(10,008)	[2,402]	{1,201}
Harrison	51,829	52,000	52,000	52,000	52,853	(10,571)	[2,537]	{1,268}	53,709	(10,742)	[2,578]	{1,289}	54,616	(10,923)	[2,622]	{1,311}
Hinds	51,219	51,378	51,378	51,378	51,604	(10,321)	[2,477]	{1,238}	51,818	(10,364)	[2,487]	{1,244}	52,017	(10,403)	[2,497]	{1,248}
Jackson	36,182	36,225	36,225	36,225	36,525	(7,305)	[1,753]	{877}	36,812	(7,362)	[1,767]	{883}	37,093	(7,419)	[1,780]	{890}
Lauderdale	18,244	18,289	18,289	18,289	18,401	(3,680)	[883]	{442}	18,502	(3,700)	[888]	{444}	18,602	(3,720)	[893]	{446}
Madison	23,381	23,494	23,494	23,494	23,661	(4,732)	[1,136]	{568}	23,834	(4,767)	[1,144]	{572}	23,995	(4,799)	[1,152]	{576}
Rankin	35,556	35,740	35,740	35,740	36,089	(7,218)	[1,732]	{866}	36,420	(7,284)	[1,748]	{874}	36,727	(7,345)	[1,763]	{881}

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.