

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

Date: 1/31/22

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 1/31/22 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.**

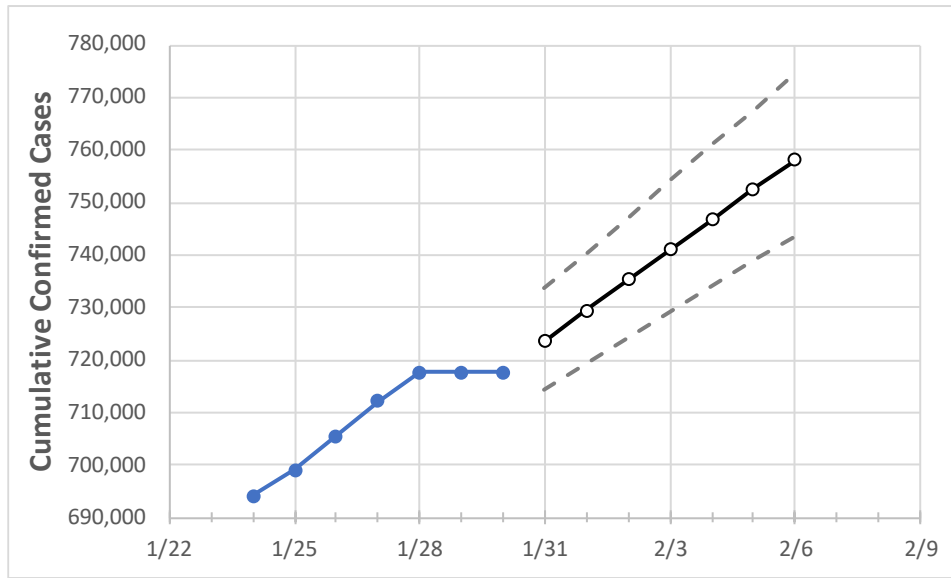
### IEM's Modeling Lead

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:						
	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6
Mississippi	712,133	717,666	717,666	717,666	723,572	729,465	735,286	741,064	746,720	752,576	758,190

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:						
	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5	2/6
DeSoto	45,511	45,754	45,754	45,754	46,054	46,342	46,629	46,910	47,187	47,476	47,763
Harrison	46,214	46,620	46,620	46,620	47,009	47,400	47,786	48,173	48,570	48,954	49,346
Hinds	48,840	49,094	49,094	49,094	49,364	49,633	49,879	50,135	50,380	50,626	50,850
Jackson	33,567	33,817	33,817	33,817	34,088	34,349	34,619	34,876	35,142	35,402	35,656
Lauderdale	16,985	17,175	17,175	17,175	17,357	17,534	17,714	17,883	18,069	18,243	18,417
Madison	21,842	21,942	21,942	21,942	22,104	22,267	22,419	22,580	22,730	22,882	23,035
Rankin	32,530	32,794	32,794	32,794	33,108	33,406	33,699	34,006	34,313	34,608	34,906

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:											
	1/27	1/28	1/29	1/30	2/1				2/3				2/5			
DeSoto	45,511	45,754	45,754	45,754	46,342	(9,268)	[2,224]	{1,112}	46,910	(9,382)	[2,252]	{1,126}	47,476	(9,495)	[2,279]	{1,139}
Harrison	46,214	46,620	46,620	46,620	47,400	(9,480)	[2,275]	{1,138}	48,173	(9,635)	[2,312]	{1,156}	48,954	(9,791)	[2,350]	{1,175}
Hinds	48,840	49,094	49,094	49,094	49,633	(9,927)	[2,382]	{1,191}	50,135	(10,027)	[2,406]	{1,203}	50,626	(10,125)	[2,430]	{1,215}
Jackson	33,567	33,817	33,817	33,817	34,349	(6,870)	[1,649]	{824}	34,876	(6,975)	[1,674]	{837}	35,402	(7,080)	[1,699]	{850}
Lauderdale	16,985	17,175	17,175	17,175	17,534	(3,507)	[842]	{421}	17,883	(3,577)	[858]	{429}	18,243	(3,649)	[876]	{438}
Madison	21,842	21,942	21,942	21,942	22,267	(4,453)	[1,069]	{534}	22,580	(4,516)	[1,084]	{542}	22,882	(4,576)	[1,098]	{549}
Rankin	32,530	32,794	32,794	32,794	33,406	(6,681)	[1,603]	{802}	34,006	(6,801)	[1,632]	{816}	34,608	(6,922)	[1,661]	{831}

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.