

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

Date: 9/22/21

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 9/22/21 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.**

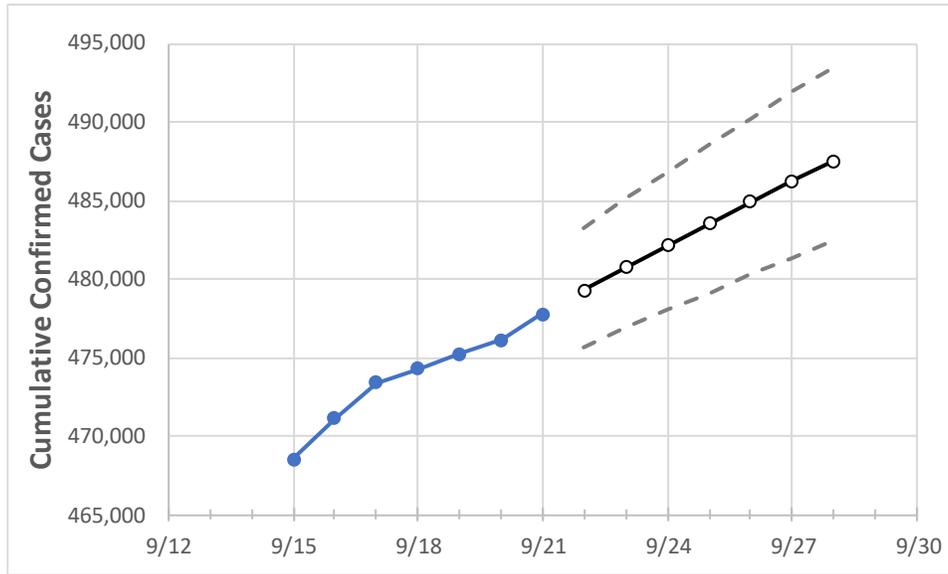
### IEM's Modeling Lead

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:							
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	
Mississippi	474,309	475,204	476,100	477,769	479,280	480,718	482,129	483,537	484,909	486,252	487,542	

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:							
	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	
DeSoto	29,881	29,947	30,014	30,148	30,257	30,364	30,474	30,578	30,684	30,789	30,893	
Harrison	32,412	32,486	32,559	32,698	32,816	32,932	33,043	33,157	33,263	33,373	33,480	
Hinds	30,748	30,792	30,837	30,882	30,939	30,993	31,049	31,101	31,154	31,208	31,257	
Jackson	23,302	23,341	23,380	23,474	23,566	23,653	23,746	23,826	23,908	24,000	24,085	
Lauderdale	11,422	11,425	11,429	11,467	11,497	11,529	11,555	11,585	11,615	11,644	11,671	
Madison	14,057	14,072	14,086	14,101	14,130	14,159	14,186	14,213	14,239	14,267	14,291	
Rankin	21,130	21,148	21,167	21,203	21,241	21,280	21,312	21,347	21,382	21,414	21,448	

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:											
	9/18	9/19	9/20	9/21	9/23				9/25				9/27			
DeSoto	29,881	29,947	30,014	30,148	30,364	(6,073)	[1,457]	{729}	30,578	(6,116)	[1,468]	{734}	30,789	(6,158)	[1,478]	{739}
Harrison	32,412	32,486	32,559	32,698	32,932	(6,586)	[1,581]	{790}	33,157	(6,631)	[1,592]	{796}	33,373	(6,675)	[1,602]	{801}
Hinds	30,748	30,792	30,837	30,882	30,993	(6,199)	[1,488]	{744}	31,101	(6,220)	[1,493]	{746}	31,208	(6,242)	[1,498]	{749}
Jackson	23,302	23,341	23,380	23,474	23,653	(4,731)	[1,135]	{568}	23,826	(4,765)	[1,144]	{572}	24,000	(4,800)	[1,152]	{576}
Lauderdale	11,422	11,425	11,429	11,467	11,529	(2,306)	[553]	{277}	11,585	(2,317)	[556]	{278}	11,644	(2,329)	[559]	{279}
Madison	14,057	14,072	14,086	14,101	14,159	(2,832)	[680]	{340}	14,213	(2,843)	[682]	{341}	14,267	(2,853)	[685]	{342}
Rankin	21,130	21,148	21,167	21,203	21,280	(4,256)	[1,021]	{511}	21,347	(4,269)	[1,025]	{512}	21,414	(4,283)	[1,028]	{514}

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.