

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 8/11/21**

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 8/11/21 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.**

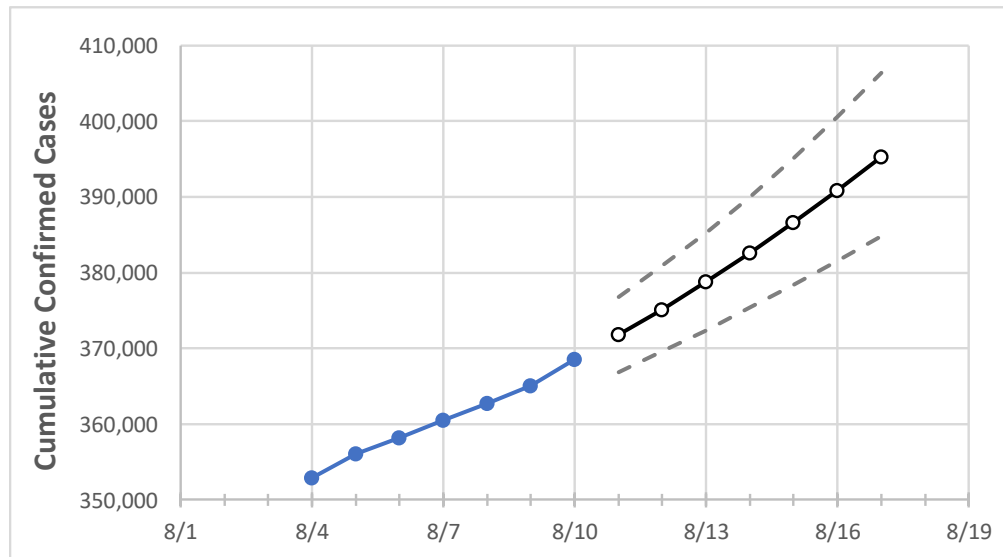
**IEM's Modeling Lead**

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:						
	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17
Mississippi	360,453	362,757	365,061	368,549	371,779	375,131	378,765	382,547	386,584	390,803	395,281

*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:						
	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16	8/17
DeSoto	23,923	24,006	24,090	24,216	24,336	24,464	24,600	24,741	24,890	25,045	25,211
Harrison	22,172	22,469	22,765	23,161	23,525	23,916	24,332	24,776	25,253	25,772	26,323
Hinds	25,193	25,347	25,501	25,616	25,777	25,937	26,096	26,254	26,415	26,573	26,735
Jackson	16,480	16,649	16,819	17,086	17,328	17,587	17,861	18,149	18,454	18,777	19,118
Lauderdale	8,521	8,604	8,688	8,811	8,939	9,074	9,223	9,384	9,556	9,736	9,929
Madison	11,405	11,459	11,512	11,559	11,628	11,700	11,775	11,852	11,930	12,012	12,097
Rankin	16,258	16,352	16,447	16,575	16,704	16,834	16,968	17,108	17,249	17,395	17,545

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:											
	8/7	8/8	8/9	8/10	8/12				8/14				8/16			
DeSoto	23,923	24,006	24,090	24,216	24,464	(4,893)	[1,174]	{587}	24,741	(4,948)	[1,188]	{594}	25,045	(5,009)	[1,202]	{601}
Harrison	22,172	22,469	22,765	23,161	23,916	(4,783)	[1,148]	{574}	24,776	(4,955)	[1,189]	{595}	25,772	(5,154)	[1,237]	{619}
Hinds	25,193	25,347	25,501	25,616	25,937	(5,187)	[1,245]	{622}	26,254	(5,251)	[1,260]	{630}	26,573	(5,315)	[1,276]	{638}
Jackson	16,480	16,649	16,819	17,086	17,587	(3,517)	[844]	{422}	18,149	(3,630)	[871]	{436}	18,777	(3,755)	[901]	{451}
Lauderdale	8,521	8,604	8,688	8,811	9,074	(1,815)	[436]	{218}	9,384	(1,877)	[450]	{225}	9,736	(1,947)	[467]	{234}
Madison	11,405	11,459	11,512	11,559	11,700	(2,340)	[562]	{281}	11,852	(2,370)	[569]	{284}	12,012	(2,402)	[577]	{288}
Rankin	16,258	16,352	16,447	16,575	16,834	(3,367)	[808]	{404}	17,108	(3,422)	[821]	{411}	17,395	(3,479)	[835]	{417}

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.