

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

Date: 9/1/21

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 9/1/21 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.**

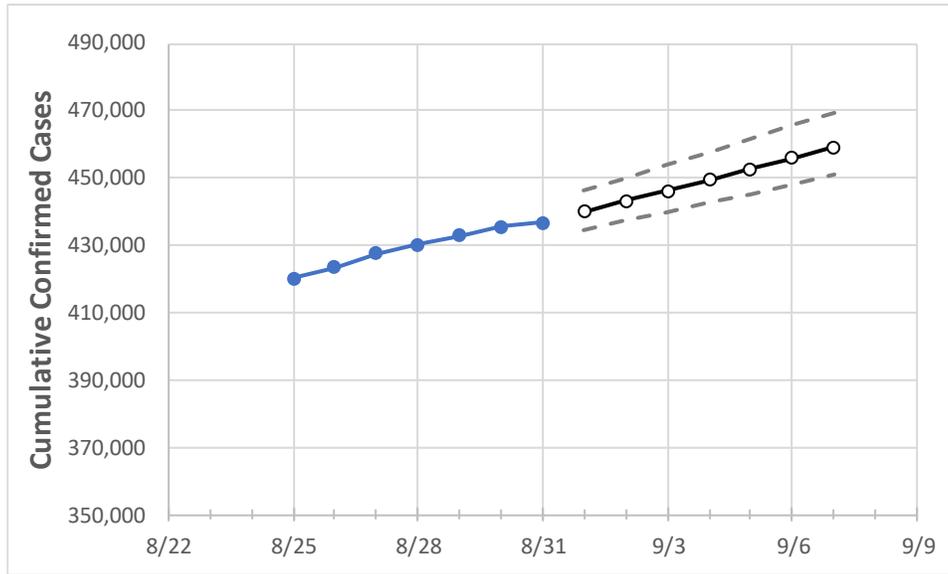
### IEM's Modeling Lead

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:							
	8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	
Mississippi	430,297	432,954	435,611	436,722	439,907	443,162	446,332	449,492	452,737	456,003	459,182	

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:							
	8/28	8/29	8/30	8/31	9/1	9/2	9/3	9/4	9/5	9/6	9/7	
DeSoto	26,948	27,099	27,250	27,317	27,493	27,677	27,858	28,042	28,236	28,427	28,624	
Harrison	28,991	29,189	29,387	29,462	29,735	29,995	30,254	30,527	30,779	31,046	31,304	
Hinds	28,694	28,951	29,209	29,253	29,440	29,628	29,810	30,005	30,189	30,389	30,582	
Jackson	20,916	21,036	21,157	21,211	21,391	21,572	21,749	21,920	22,101	22,269	22,452	
Lauderdale	10,454	10,508	10,563	10,572	10,651	10,720	10,796	10,868	10,941	11,014	11,084	
Madison	13,040	13,140	13,239	13,261	13,361	13,455	13,552	13,648	13,754	13,856	13,959	
Rankin	19,552	19,719	19,886	19,907	20,086	20,277	20,465	20,667	20,850	21,056	21,252	

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:											
	8/28	8/29	8/30	8/31	9/2				9/4				9/6			
DeSoto	26,948	27,099	27,250	27,317	27,677	(5,535)	[1,329]	{664}	28,042	(5,608)	[1,346]	{673}	28,427	(5,685)	[1,364]	{682}
Harrison	28,991	29,189	29,387	29,462	29,995	(5,999)	[1,440]	{720}	30,527	(6,105)	[1,465]	{733}	31,046	(6,209)	[1,490]	{745}
Hinds	28,694	28,951	29,209	29,253	29,628	(5,926)	[1,422]	{711}	30,005	(6,001)	[1,440]	{720}	30,389	(6,078)	[1,459]	{729}
Jackson	20,916	21,036	21,157	21,211	21,572	(4,314)	[1,035]	{518}	21,920	(4,384)	[1,052]	{526}	22,269	(4,454)	[1,069]	{534}
Lauderdale	10,454	10,508	10,563	10,572	10,720	(2,144)	[515]	{257}	10,868	(2,174)	[522]	{261}	11,014	(2,203)	[529]	{264}
Madison	13,040	13,140	13,239	13,261	13,455	(2,691)	[646]	{323}	13,648	(2,730)	[655]	{328}	13,856	(2,771)	[665]	{333}
Rankin	19,552	19,719	19,886	19,907	20,277	(4,055)	[973]	{487}	20,667	(4,133)	[992]	{496}	21,056	(4,211)	[1,011]	{505}

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.