

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 6/22/21**

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 6/22/21 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.**

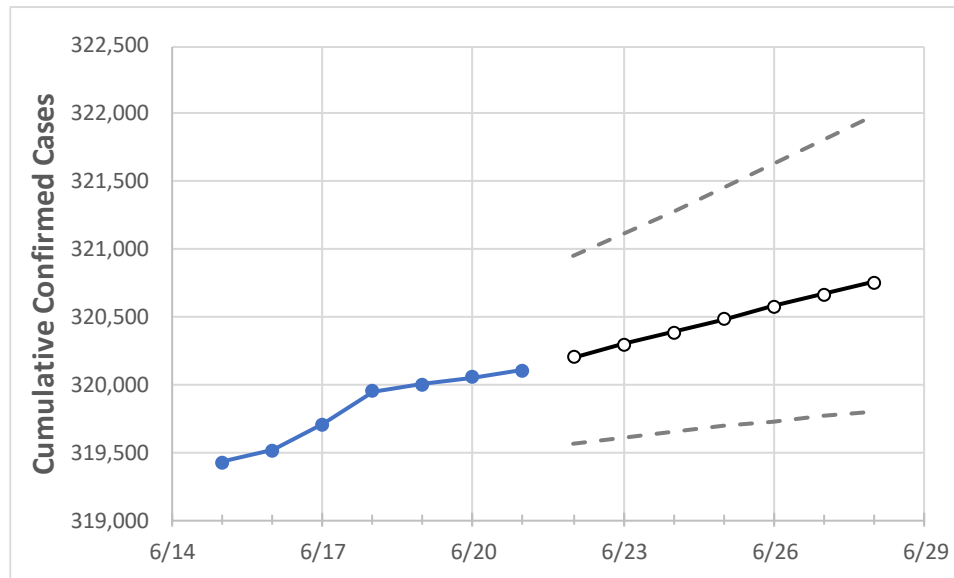
**IEM's Modeling Lead**

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:						
	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28
Mississippi	319,948	320,001	320,054	320,107	320,204	320,296	320,389	320,482	320,575	320,666	320,754

*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:						
	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28
DeSoto	22,285	22,287	22,289	22,291	22,296	22,302	22,307	22,311	22,316	22,321	22,325
Harrison	18,431	18,435	18,440	18,444	18,455	18,466	18,476	18,487	18,497	18,508	18,518
Hinds	20,719	20,726	20,734	20,741	20,752	20,763	20,774	20,785	20,796	20,808	20,819
Jackson	13,718	13,722	13,727	13,731	13,738	13,746	13,754	13,761	13,769	13,776	13,785
Lauderdale	7,261	7,262	7,262	7,263	7,264	7,265	7,266	7,266	7,267	7,268	7,269
Madison	10,263	10,265	10,268	10,270	10,276	10,281	10,287	10,293	10,300	10,306	10,313
Rankin	13,901	13,906	13,912	13,917	13,923	13,930	13,936	13,942	13,948	13,955	13,961

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:											
	6/18	6/19	6/20	6/21	6/23				6/25				6/27			
DeSoto	22,285	22,287	22,289	22,291	22,302	(4,460)	[1,070]	{535}	22,311	(4,462)	[1,071]	{535}	22,321	(4,464)	[1,071]	{536}
Harrison	18,431	18,435	18,440	18,444	18,466	(3,693)	[886]	{443}	18,487	(3,697)	[887]	{444}	18,508	(3,702)	[888]	{444}
Hinds	20,719	20,726	20,734	20,741	20,763	(4,153)	[997]	{498}	20,785	(4,157)	[998]	{499}	20,808	(4,162)	[999]	{499}
Jackson	13,718	13,722	13,727	13,731	13,746	(2,749)	[660]	{330}	13,761	(2,752)	[661]	{330}	13,776	(2,755)	[661]	{331}
Lauderdale	7,261	7,262	7,262	7,263	7,265	(1,453)	[349]	{174}	7,266	(1,453)	[349]	{174}	7,268	(1,454)	[349]	{174}
Madison	10,263	10,265	10,268	10,270	10,281	(2,056)	[494]	{247}	10,293	(2,059)	[494]	{247}	10,306	(2,061)	[495]	{247}
Rankin	13,901	13,906	13,912	13,917	13,930	(2,786)	[669]	{334}	13,942	(2,788)	[669]	{335}	13,955	(2,791)	[670]	{335}

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.