

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 12/8/21**

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 12/8/21 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.**

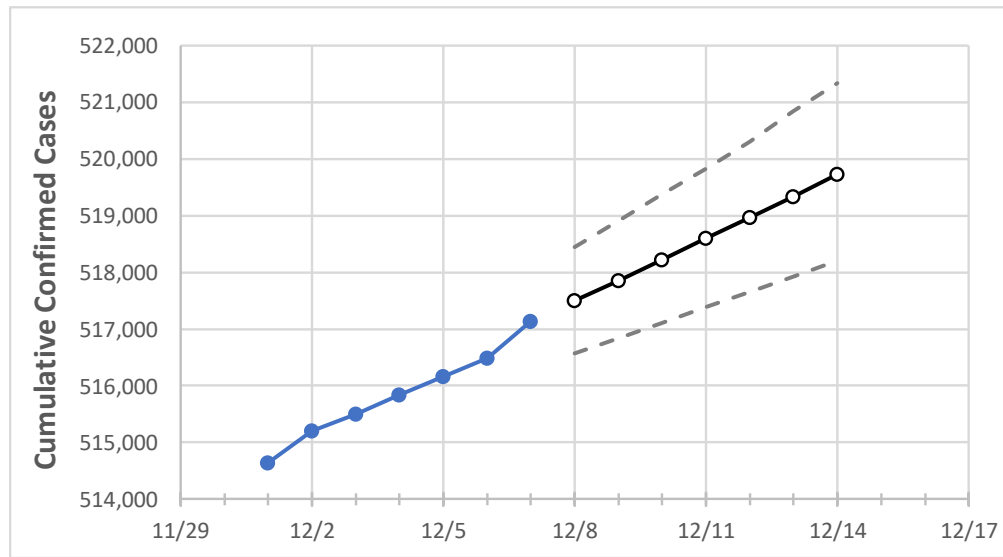
**IEM's Modeling Lead**

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:						
	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
Mississippi	515,831	516,159	516,486	517,138	517,499	517,851	518,215	518,594	518,965	519,333	519,732

*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:						
	12/4	12/5	12/6	12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14
DeSoto	33,394	33,429	33,463	33,512	33,541	33,570	33,599	33,627	33,658	33,689	33,717
Harrison	35,013	35,028	35,042	35,086	35,106	35,125	35,146	35,165	35,186	35,208	35,228
Hinds	32,761	32,779	32,797	32,826	32,849	32,872	32,894	32,919	32,943	32,968	32,993
Jackson	24,913	24,919	24,926	24,938	24,946	24,953	24,961	24,969	24,977	24,985	24,993
Lauderdale	12,316	12,321	12,326	12,343	12,350	12,357	12,365	12,372	12,379	12,387	12,393
Madison	14,962	14,970	14,978	14,986	14,995	15,004	15,013	15,022	15,031	15,040	15,050
Rankin	22,574	22,584	22,593	22,621	22,636	22,652	22,668	22,684	22,702	22,719	22,737

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:											
	12/4	12/5	12/6	12/7	12/9				12/11				12/13			
DeSoto	33,394	33,429	33,463	33,512	33,570	(6,714)	[1,611]	{806}	33,627	(6,725)	[1,614]	{807}	33,689	(6,738)	[1,617]	{809}
Harrison	35,013	35,028	35,042	35,086	35,125	(7,025)	[1,686]	{843}	35,165	(7,033)	[1,688]	{844}	35,208	(7,042)	[1,690]	{845}
Hinds	32,761	32,779	32,797	32,826	32,872	(6,574)	[1,578]	{789}	32,919	(6,584)	[1,580]	{790}	32,968	(6,594)	[1,582]	{791}
Jackson	24,913	24,919	24,926	24,938	24,953	(4,991)	[1,198]	{599}	24,969	(4,994)	[1,199]	{599}	24,985	(4,997)	[1,199]	{600}
Lauderdale	12,316	12,321	12,326	12,343	12,357	(2,471)	[593]	{297}	12,372	(2,474)	[594]	{297}	12,387	(2,477)	[595]	{297}
Madison	14,962	14,970	14,978	14,986	15,004	(3,001)	[720]	{360}	15,022	(3,004)	[721]	{361}	15,040	(3,008)	[722]	{361}
Rankin	22,574	22,584	22,593	22,621	22,652	(4,530)	[1,087]	{544}	22,684	(4,537)	[1,089]	{544}	22,719	(4,544)	[1,091]	{545}

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.