

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 10/22/21**

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 10/22/21 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.

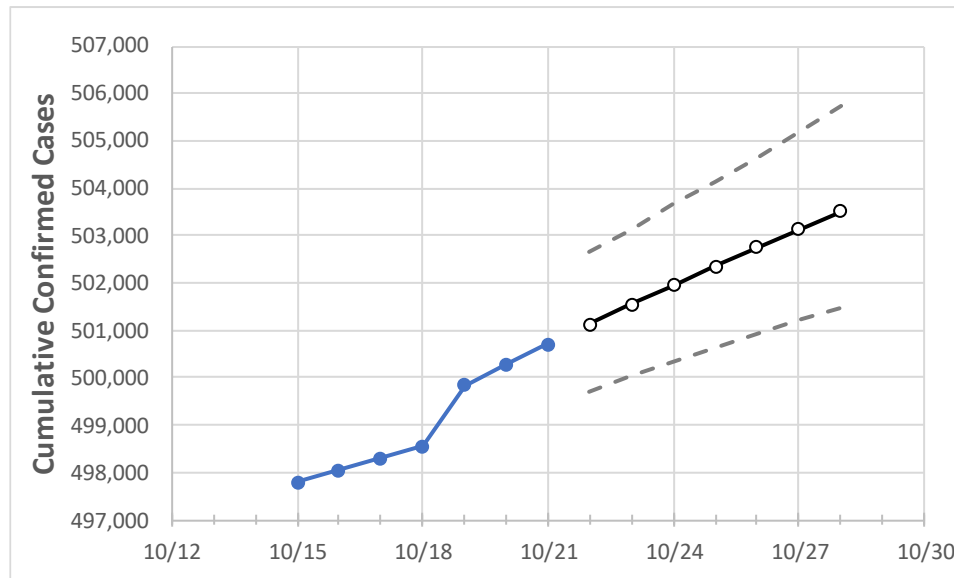
IEM's Modeling Lead

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:						
	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28
Mississippi	498,560	499,838	500,286	500,709	501,127	501,545	501,942	502,354	502,755	503,136	503,515

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:						
	10/18	10/19	10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28
DeSoto	31,916	32,000	32,039	32,080	32,116	32,151	32,184	32,217	32,249	32,282	32,311
Harrison	34,150	34,258	34,281	34,312	34,342	34,370	34,401	34,425	34,453	34,482	34,507
Hinds	31,878	31,898	31,911	31,924	31,942	31,959	31,976	31,991	32,008	32,026	32,040
Jackson	24,352	24,452	24,466	24,482	24,501	24,522	24,541	24,559	24,577	24,598	24,615
Lauderdale	11,944	11,981	11,984	11,985	11,995	12,005	12,013	12,022	12,030	12,039	12,047
Madison	14,547	14,558	14,566	14,574	14,581	14,588	14,595	14,602	14,608	14,615	14,621
Rankin	21,928	21,953	21,971	21,983	21,998	22,012	22,026	22,040	22,055	22,069	22,082

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:											
	10/18	10/19	10/20	10/21	10/23				10/25				10/27			
DeSoto	31,916	32,000	32,039	32,080	32,151	(6,430)	[1,543]	{772}	32,217	(6,443)	[1,546]	{773}	32,282	(6,456)	[1,550]	{775}
Harrison	34,150	34,258	34,281	34,312	34,370	(6,874)	[1,650]	{825}	34,425	(6,885)	[1,652]	{826}	34,482	(6,896)	[1,655]	{828}
Hinds	31,878	31,898	31,911	31,924	31,959	(6,392)	[1,534]	{767}	31,991	(6,398)	[1,536]	{768}	32,026	(6,405)	[1,537]	{769}
Jackson	24,352	24,452	24,466	24,482	24,522	(4,904)	[1,177]	{589}	24,559	(4,912)	[1,179]	{589}	24,598	(4,920)	[1,181]	{590}
Lauderdale	11,944	11,981	11,984	11,985	12,005	(2,401)	[576]	{288}	12,022	(2,404)	[577]	{289}	12,039	(2,408)	[578]	{289}
Madison	14,547	14,558	14,566	14,574	14,588	(2,918)	[700]	{350}	14,602	(2,920)	[701]	{350}	14,615	(2,923)	[702]	{351}
Rankin	21,928	21,953	21,971	21,983	22,012	(4,402)	[1,057]	{528}	22,040	(4,408)	[1,058]	{529}	22,069	(4,414)	[1,059]	{530}

For additional information from IEM, please contact Jon Mabry, Vice President of Disaster Recovery at 601-953-4562 or jon.mabry@iem.com or Bryan Koon, Vice President of Emergency Management and Homeland Security at bryan.koon@iem.com or 850-519-7966.