

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

Date: 9/17/21

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 9/17/21 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.**

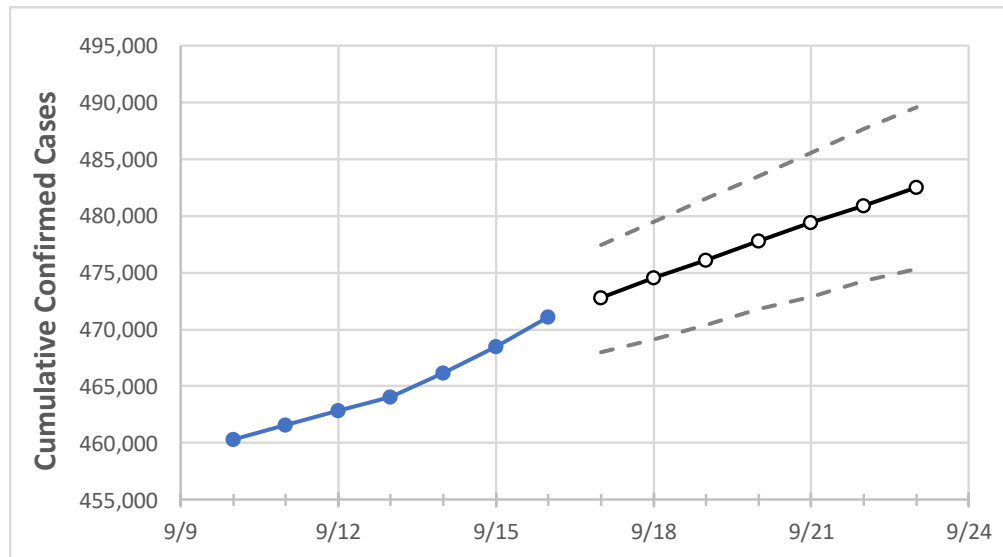
### IEM's Modeling Lead

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:						
	9/13	9/14	9/15	9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23
Mississippi	464,075	466,145	468,498	471,092	472,770	474,530	476,105	477,763	479,394	480,918	482,526

*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:						
	9/13	9/14	9/15	9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23
DeSoto	29,217	29,346	29,532	29,693	29,826	29,954	30,083	30,214	30,342	30,468	30,596
Harrison	31,603	31,767	31,907	32,160	32,290	32,424	32,554	32,670	32,798	32,920	33,039
Hinds	30,337	30,454	30,552	30,628	30,699	30,769	30,837	30,906	30,972	31,039	31,100
Jackson	22,669	22,754	22,868	23,098	23,201	23,299	23,390	23,483	23,569	23,668	23,756
Lauderdale	11,119	11,187	11,244	11,301	11,332	11,364	11,392	11,425	11,452	11,482	11,511
Madison	13,880	13,914	13,961	13,993	14,033	14,069	14,106	14,144	14,181	14,218	14,252
Rankin	20,867	20,946	21,016	21,062	21,115	21,165	21,218	21,267	21,311	21,360	21,407

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:											
	9/13	9/14	9/15	9/16	9/18				9/20				9/22			
DeSoto	29,217	29,346	29,532	29,693	29,954	(5,991)	[1,438]	{719}	30,214	(6,043)	[1,450]	{725}	30,468	(6,094)	[1,462]	{731}
Harrison	31,603	31,767	31,907	32,160	32,424	(6,485)	[1,556]	{778}	32,670	(6,534)	[1,568]	{784}	32,920	(6,584)	[1,580]	{790}
Hinds	30,337	30,454	30,552	30,628	30,769	(6,154)	[1,477]	{738}	30,906	(6,181)	[1,483]	{742}	31,039	(6,208)	[1,490]	{745}
Jackson	22,669	22,754	22,868	23,098	23,299	(4,660)	[1,118]	{559}	23,483	(4,697)	[1,127]	{564}	23,668	(4,734)	[1,136]	{568}
Lauderdale	11,119	11,187	11,244	11,301	11,364	(2,273)	[545]	{273}	11,425	(2,285)	[548]	{274}	11,482	(2,296)	[551]	{276}
Madison	13,880	13,914	13,961	13,993	14,069	(2,814)	[675]	{338}	14,144	(2,829)	[679]	{339}	14,218	(2,844)	[682]	{341}
Rankin	20,867	20,946	21,016	21,062	21,165	(4,233)	[1,016]	{508}	21,267	(4,253)	[1,021]	{510}	21,360	(4,272)	[1,025]	{513}

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.