

IEM's AI Modeling: Short-term COVID-19 Projections**Date: 9/20/21**

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 9/20/21 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.

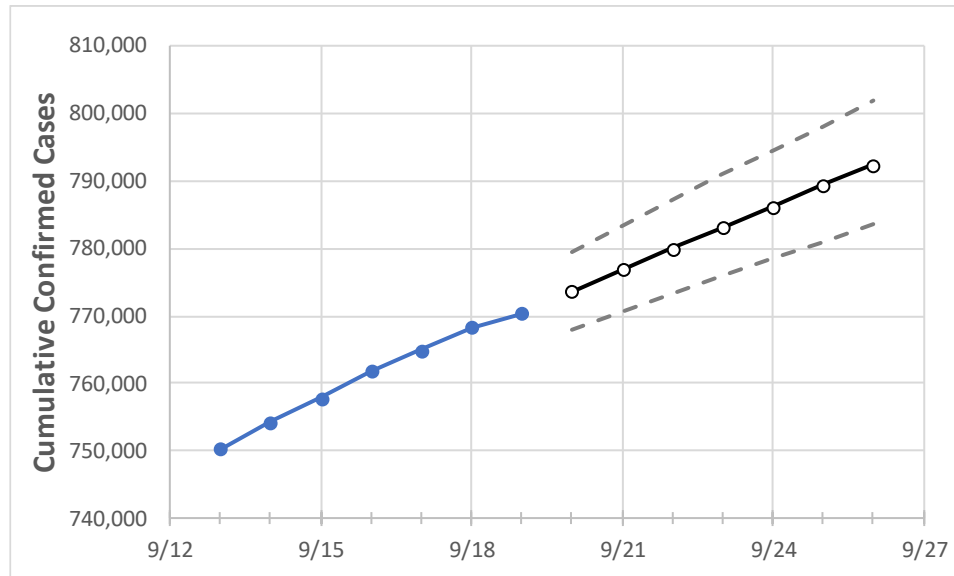
IEM's Modeling Lead

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.

Alabama State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26
Alabama	761,865	764,839	768,301	770,391	773,579	776,898	779,986	783,150	786,238	789,407	792,371

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.

Alabama Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	9/16	9/17	9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26
Jefferson	108,713	108,997	109,348	109,572	109,903	110,217	110,520	110,826	111,128	111,424	111,705
Lee	21,708	21,787	21,908	21,977	22,072	22,166	22,258	22,354	22,446	22,541	22,635
Madison	47,959	48,181	48,418	48,595	48,821	49,040	49,263	49,479	49,702	49,921	50,127
Marshall	17,138	17,217	17,272	17,302	17,378	17,451	17,525	17,600	17,669	17,744	17,819
Mobile	69,614	69,804	69,989	70,081	70,376	70,711	70,991	71,273	71,605	71,902	72,175
Montgomery	32,358	32,475	32,582	32,650	32,746	32,841	32,933	33,025	33,116	33,204	33,291
Shelby	34,948	35,053	35,193	35,304	35,438	35,571	35,706	35,837	35,961	36,098	36,219
Tuscaloosa	32,719	32,903	33,029	33,128	33,281	33,439	33,591	33,743	33,899	34,061	34,215

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.

Alabama Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	9/16	9/17	9/18	9/19	9/21			9/23			9/25					
Jefferson	108,713	108,997	109,348	109,572	110,217	(22,043)	{5,290}	{2,645}	110,826	(22,165)	[5,320]	{2,660}	111,424	(22,285)	[5,348]	{2,674}
Lee	21,708	21,787	21,908	21,977	22,166	(4,433)	{1,064}	{532}	22,354	(4,471)	[1,073]	{537}	22,541	(4,508)	[1,082]	{541}
Madison	47,959	48,181	48,418	48,595	49,040	(9,808)	[2,354]	{1,177}	49,479	(9,896)	[2,375]	{1,188}	49,921	(9,984)	[2,396]	{1,198}
Marshall	17,138	17,217	17,272	17,302	17,451	(3,490)	[838]	{419}	17,600	(3,520)	[845]	{422}	17,744	(3,549)	[852]	{426}
Mobile	69,614	69,804	69,989	70,081	70,711	(14,142)	[3,394]	{1,697}	71,273	(14,255)	[3,421]	{1,711}	71,902	(14,380)	[3,451]	{1,726}
Montgomery	32,358	32,475	32,582	32,650	32,841	(6,568)	[1,576]	{788}	33,025	(6,605)	[1,585]	{793}	33,204	(6,641)	[1,594]	{797}
Shelby	34,948	35,053	35,193	35,304	35,571	(7,114)	[1,707]	{854}	35,837	(7,167)	[1,720]	{860}	36,098	(7,220)	[1,733]	{866}
Tuscaloosa	32,719	32,903	33,029	33,128	33,439	(6,688)	[1,605]	{803}	33,743	(6,749)	[1,620]	{810}	34,061	(6,812)	[1,635]	{817}

For additional information from IEM, please contact Bryan Koon, Vice President of Emergency Management and Homeland Security at bryan.koon@iem.com or 850-519-7966 or Stephanie Tennyson at stephanie.tennyson@iem.com or 202-309-4257.