

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 1/21/22**

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 1/21/22 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.**

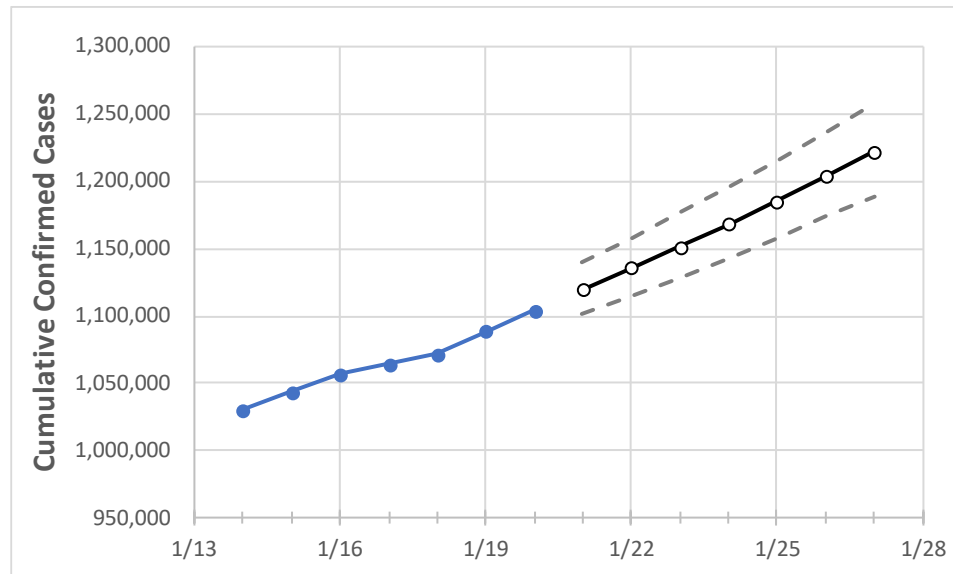
**IEM's Modeling Lead**

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:						
	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27
Alabama	1,064,536	1,071,264	1,088,370	1,104,356	1,119,567	1,135,586	1,151,509	1,168,345	1,185,476	1,203,708	1,222,133

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:						
	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27
Jefferson	154,647	155,617	157,776	159,848	161,909	163,961	166,007	168,180	170,357	172,572	174,759
Lee	32,328	32,459	32,940	33,346	33,777	34,238	34,692	35,184	35,695	36,210	36,735
Madison	70,548	70,947	71,990	73,257	74,354	75,472	76,582	77,764	78,989	80,250	81,510
Marshall	22,007	22,159	22,555	23,013	23,319	23,647	23,985	24,343	24,710	25,105	25,511
Mobile	96,499	97,159	98,462	99,629	101,035	102,448	103,906	105,402	106,954	108,520	110,146
Montgomery	46,591	46,803	47,132	47,558	48,085	48,616	49,136	49,661	50,213	50,767	51,309
Shelby	49,000	49,328	50,124	50,904	51,571	52,256	52,951	53,673	54,410	55,188	55,969
Tuscaloosa	45,186	45,449	46,371	47,148	47,946	48,771	49,640	50,564	51,500	52,514	53,532

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:											
	1/17	1/18	1/19	1/20	1/22				1/24				1/26			
Jefferson	154,647	155,617	157,776	159,848	163,961	(32,792)	[7,870]	{3,935}	168,180	(33,636)	[8,073]	{4,036}	172,572	(34,514)	[8,283]	{4,142}
Lee	32,328	32,459	32,940	33,346	34,238	(6,848)	[1,643]	{822}	35,184	(7,037)	[1,689]	{844}	36,210	(7,242)	[1,738]	{869}
Madison	70,548	70,947	71,990	73,257	75,472	(15,094)	[3,623]	{1,811}	77,764	(15,553)	[3,733]	{1,866}	80,250	(16,050)	[3,852]	{1,926}
Marshall	22,007	22,159	22,555	23,013	23,647	(4,729)	[1,135]	{568}	24,343	(4,869)	[1,168]	{584}	25,105	(5,021)	[1,205]	{603}
Mobile	96,499	97,159	98,462	99,629	102,448	(20,490)	[4,918]	{2,459}	105,402	(21,080)	[5,059]	{2,530}	108,520	(21,704)	[5,209]	{2,604}
Montgomery	46,591	46,803	47,132	47,558	48,616	(9,723)	[2,334]	{1,167}	49,661	(9,932)	[2,384]	{1,192}	50,767	(10,153)	[2,437]	{1,218}
Shelby	49,000	49,328	50,124	50,904	52,256	(10,451)	[2,508]	{1,254}	53,673	(10,735)	[2,576]	{1,288}	55,188	(11,038)	[2,649]	{1,325}
Tuscaloosa	45,186	45,449	46,371	47,148	48,771	(9,754)	[2,341]	{1,171}	50,564	(10,113)	[2,427]	{1,214}	52,514	(10,503)	[2,521]	{1,260}

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