

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

**Date: 3/2/21**

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 3/2/21 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.**

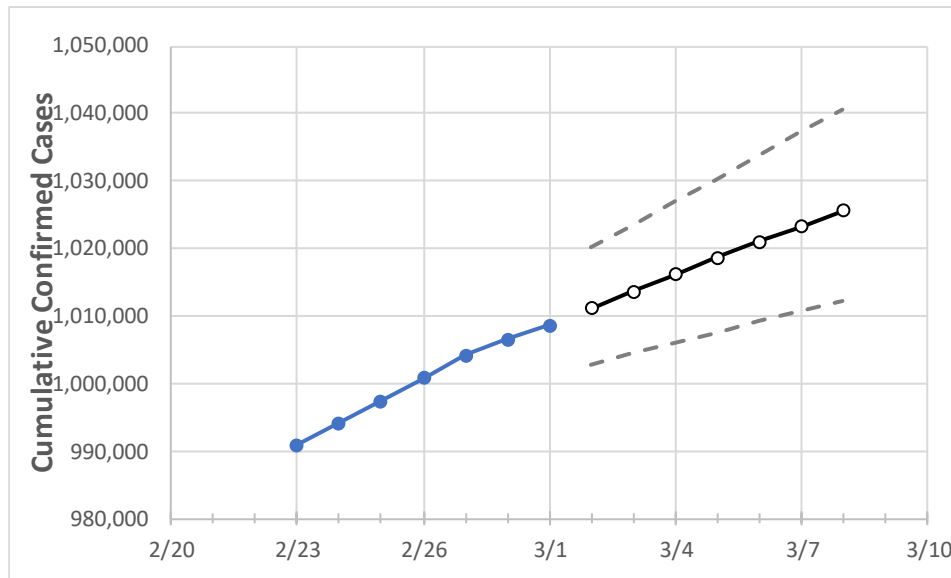
### **IEM's Modeling Lead**

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.

## Georgia State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8
Georgia	1,000,822	1,004,187	1,006,521	1,008,660	1,011,173	1,013,647	1,016,147	1,018,635	1,021,032	1,023,298	1,025,615

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.

## Georgia Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8
Bartow	12,905	12,969	13,003	13,032	13,089	13,146	13,199	13,252	13,306	13,358	13,412
Carroll	10,509	10,534	10,545	10,556	10,577	10,597	10,616	10,635	10,654	10,672	10,690
Cherokee	27,233	27,311	27,369	27,426	27,534	27,643	27,750	27,857	27,962	28,065	28,170
Clarke	14,048	14,071	14,087	14,100	14,118	14,135	14,152	14,168	14,183	14,198	14,212
Clayton	23,124	23,191	23,242	23,301	23,371	23,439	23,506	23,572	23,641	23,703	23,768
Cobb	69,090	69,273	69,453	69,646	69,815	69,980	70,145	70,304	70,457	70,612	70,759
DeKalb	56,643	56,814	56,950	57,093	57,250	57,405	57,558	57,710	57,857	58,002	58,149
Dougherty	7,042	7,055	7,059	7,060	7,067	7,073	7,080	7,085	7,091	7,097	7,102
Douglas	13,355	13,386	13,415	13,442	13,475	13,507	13,539	13,569	13,598	13,626	13,655
Fulton	85,040	85,312	85,589	85,878	86,125	86,369	86,618	86,859	87,103	87,339	87,573
Gwinnett	91,710	91,962	92,195	92,410	92,634	92,847	93,060	93,278	93,483	93,689	93,890
Hall	25,434	25,464	25,511	25,544	25,583	25,622	25,661	25,698	25,734	25,771	25,806
Henry	21,425	21,568	21,680	21,823	21,921	22,018	22,118	22,220	22,324	22,429	22,534
Lee	2,576	2,579	2,578	2,578	2,582	2,586	2,589	2,593	2,596	2,600	2,603

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.

### Georgia Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	2/26	2/27	2/28	3/1	3/3				3/5				3/7			
Bartow	12,905	12,969	13,003	13,032	13,146	(2,629)	{631}	{316}	13,252	(2,650)	{636}	{318}	13,358	(2,672)	{641}	{321}
Carroll	10,509	10,534	10,545	10,556	10,597	(2,119)	{509}	{254}	10,635	(2,127)	{510}	{255}	10,672	(2,134)	{512}	{256}
Cherokee	27,233	27,311	27,369	27,426	27,643	(5,529)	{1,327}	{663}	27,857	(5,571)	{1,337}	{669}	28,065	(5,613)	{1,347}	{674}
Clarke	14,048	14,071	14,087	14,100	14,135	(2,827)	{679}	{339}	14,168	(2,834)	{680}	{340}	14,198	(2,840)	{681}	{341}
Clayton	23,124	23,191	23,242	23,301	23,439	(4,688)	{1,125}	{563}	23,572	(4,714)	{1,131}	{566}	23,703	(4,741)	{1,138}	{569}
Cobb	69,090	69,273	69,453	69,646	69,980	(13,996)	{3,359}	{1,680}	70,304	(14,061)	{3,375}	{1,687}	70,612	(14,122)	{3,389}	{1,695}
DeKalb	56,643	56,814	56,950	57,093	57,405	(11,481)	{2,755}	{1,378}	57,710	(11,542)	{2,770}	{1,385}	58,002	(11,600)	{2,784}	{1,392}
Dougherty	7,042	7,055	7,059	7,060	7,073	(1,415)	{340}	{170}	7,085	(1,417)	{340}	{170}	7,097	(1,419)	{341}	{170}
Douglas	13,355	13,386	13,415	13,442	13,507	(2,701)	{648}	{324}	13,569	(2,714)	{651}	{326}	13,626	(2,725)	{654}	{327}
Fulton	85,040	85,312	85,589	85,878	86,369	(17,274)	{4,146}	{2,073}	86,859	(17,372)	{4,169}	{2,085}	87,339	(17,468)	{4,192}	{2,096}
Gwinnett	91,710	91,962	92,195	92,410	92,847	(18,569)	{4,457}	{2,228}	93,278	(18,656)	{4,477}	{2,239}	93,689	(18,738)	{4,497}	{2,249}
Hall	25,434	25,464	25,511	25,544	25,622	(5,124)	{1,230}	{615}	25,698	(5,140)	{1,233}	{617}	25,771	(5,154)	{1,237}	{618}
Henry	21,425	21,568	21,680	21,823	22,018	(4,404)	{1,057}	{528}	22,220	(4,444)	{1,067}	{533}	22,429	(4,486)	{1,077}	{538}
Lee	2,576	2,579	2,578	2,578	2,586	(517)	{124}	{62}	2,593	(519)	{124}	{62}	2,600	(520)	{125}	{62}

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.