

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 7/16/21**

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 7/16/21 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.**

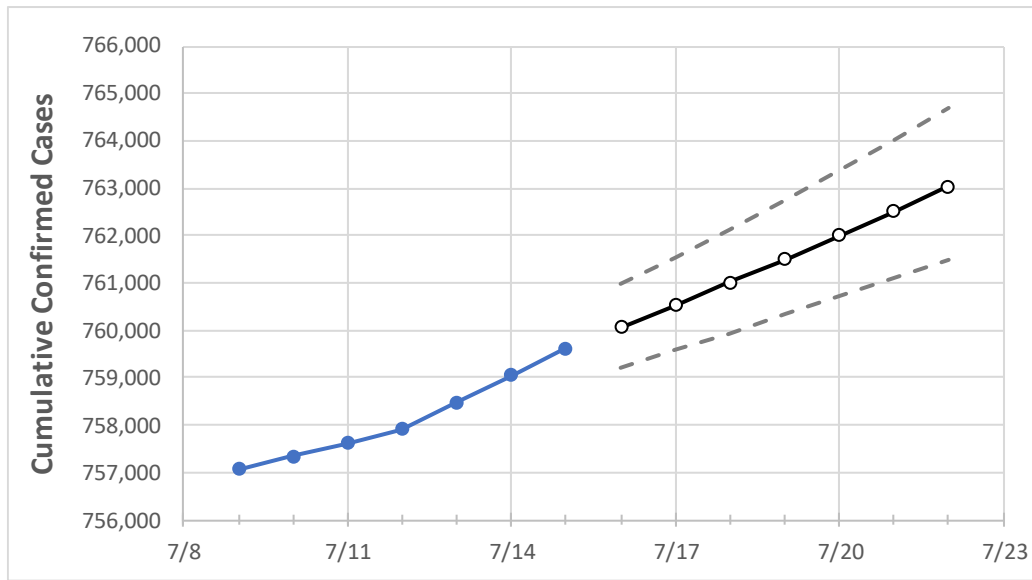
**IEM's Modeling Lead**

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.

## Indiana State Projections



	Actual Confirmed Cases On:				Projected Cases For:						
	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22
Indiana	757,904	758,479	759,062	759,618	760,067	760,526	761,008	761,503	762,006	762,519	763,050

*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.*

## Indiana Counties

	Actual Confirmed Cases On:				Projected Cases For:						
	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22
Decatur	2,904	2,906	2,906	2,906	2,907	2,908	2,908	2,909	2,910	2,911	2,912
Hamilton	36,844	36,863	36,879	36,913	36,929	36,945	36,962	36,979	36,997	37,015	37,033
Hendricks	17,839	17,851	17,879	17,894	17,908	17,922	17,937	17,953	17,970	17,988	18,006
Johnson	18,584	18,595	18,609	18,616	18,623	18,631	18,638	18,646	18,653	18,661	18,669
Lake	56,567	56,596	56,615	56,632	56,659	56,685	56,710	56,736	56,761	56,786	56,810
Madison	13,297	13,336	13,347	13,354	13,367	13,380	13,394	13,408	13,423	13,439	13,455
Marion	104,019	104,107	104,187	104,248	104,307	104,369	104,432	104,496	104,564	104,634	104,707
St. Joseph	37,121	37,140	37,146	37,154	37,163	37,172	37,181	37,190	37,200	37,210	37,220

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.

### Indiana Medical Demands by County

	Actual Confirmed Cases On:				Projected Cases (Hospitalized) [ICU] {Ventilator} For:											
	7/12	7/13	7/14	7/15	7/17				7/19				7/21			
Decatur	2,904	2,906	2,906	2,906	2,908	(582)	[140]	{70}	2,909	(582)	[140]	{70}	2,911	(582)	[140]	{70}
Hamilton	36,844	36,863	36,879	36,913	36,945	(7,389)	[1,773]	{887}	36,979	(7,396)	[1,775]	{888}	37,015	(7,403)	[1,777]	{888}
Hendricks	17,839	17,851	17,879	17,894	17,922	(3,584)	[860]	{430}	17,953	(3,591)	[862]	{431}	17,988	(3,598)	[863]	{432}
Johnson	18,584	18,595	18,609	18,616	18,631	(3,726)	[894]	{447}	18,646	(3,729)	[895]	{447}	18,661	(3,732)	[896]	{448}
Lake	56,567	56,596	56,615	56,632	56,685	(11,337)	[2,721]	{1,360}	56,736	(11,347)	[2,723]	{1,362}	56,786	(11,357)	[2,726]	{1,363}
Madison	13,297	13,336	13,347	13,354	13,380	(2,676)	[642]	{321}	13,408	(2,682)	[644]	{322}	13,439	(2,688)	[645]	{323}
Marion	104,019	104,107	104,187	104,248	104,369	(20,874)	[5,010]	{2,505}	104,496	(20,899)	[5,016]	{2,508}	104,634	(20,927)	[5,022]	{2,511}
St. Joseph	37,121	37,140	37,146	37,154	37,172	(7,434)	[1,784]	{892}	37,190	(7,438)	[1,785]	{893}	37,210	(7,442)	[1,786]	{893}

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.