

**IEM's AI Modeling: Short-term COVID-19 Projections****Date: 7/28/21**

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 7/28/21 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.**

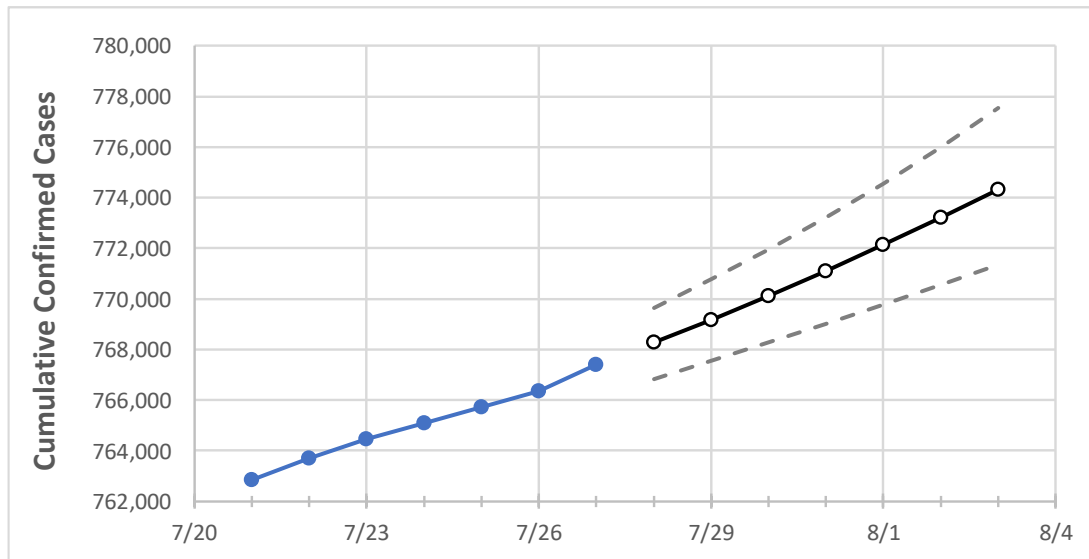
**IEM's Modeling Lead**

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:					
	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3
Indiana	765,082	765,717	766,351	767,409	768,272	769,171	770,104	771,092	772,130	773,211	774,330

*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:						
	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31	8/1	8/2	8/3
Decatur	2,915	2,916	2,916	2,925	2,927	2,929	2,932	2,934	2,937	2,940	2,943
Hamilton	37,174	37,217	37,260	37,298	37,347	37,400	37,456	37,516	37,581	37,649	37,723
Hendricks	18,028	18,043	18,059	18,072	18,088	18,105	18,123	18,141	18,159	18,178	18,196
Johnson	18,772	18,790	18,807	18,822	18,846	18,871	18,898	18,927	18,957	18,988	19,022
Lake	56,822	56,845	56,869	56,919	56,945	56,971	56,997	57,022	57,049	57,076	57,103
Madison	13,481	13,500	13,518	13,548	13,567	13,586	13,607	13,629	13,651	13,675	13,698
Marion	105,069	105,168	105,267	105,425	105,562	105,706	105,855	106,014	106,177	106,354	106,539
St. Joseph	37,264	37,275	37,286	37,313	37,331	37,349	37,369	37,389	37,411	37,432	37,455

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:											
	7/24	7/25	7/26	7/27	7/29				7/31				8/2			
Decatur	2,915	2,916	2,916	2,925	2,929 (586) [141] {70}				2,934 (587) [141] {70}				2,940 (588) [141] {71}			
Hamilton	37,174	37,217	37,260	37,298	37,400 (7,480) [1,795] {898}				37,516 (7,503) [1,801] {900}				37,649 (7,530) [1,807] {904}			
Hendricks	18,028	18,043	18,059	18,072	18,105 (3,621) [869] {435}				18,141 (3,628) [871] {435}				18,178 (3,636) [873] {436}			
Johnson	18,772	18,790	18,807	18,822	18,871 (3,774) [906] {453}				18,927 (3,785) [909] {454}				18,988 (3,798) [911] {456}			
Lake	56,822	56,845	56,869	56,919	56,971 (11,394) [2,735] {1,367}				57,022 (11,404) [2,737] {1,369}				57,076 (11,415) [2,740] {1,370}			
Madison	13,481	13,500	13,518	13,548	13,586 (2,717) [652] {326}				13,629 (2,726) [654] {327}				13,675 (2,735) [656] {328}			
Marion	105,069	105,168	105,267	105,425	105,706 (21,141) [5,074] {2,537}				106,014 (21,203) [5,089] {2,544}				106,354 (21,271) [5,105] {2,553}			
St. Joseph	37,264	37,275	37,286	37,313	37,349 (7,470) [1,793] {896}				37,389 (7,478) [1,795] {897}				37,432 (7,486) [1,797] {898}			

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.